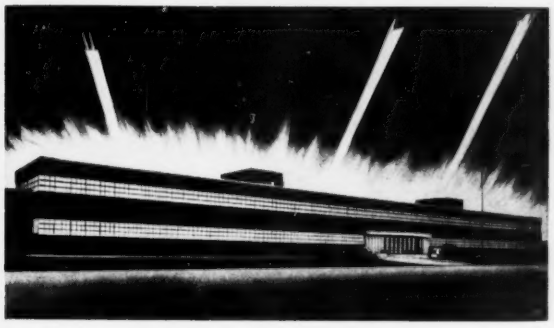
Metal Finishing

POLISHING AND BUFFING · BARREL FINISHING · CLEANING
PLATING · ANODIZING · RUST PROOFING · LACQUERING & ENAMELING

JUNE, 1959

CONTENTS:

CONVENTION AND EXPOSITION IN DETROIT



Complete Program Section

Better Buffing Thru Better Buff Design
Buffs and Their Uses

Rectifiers in the Electroplating Industry
Still Tank Plating

Dip Dyeing of Finishes for Vacuum Metalizing
Colored Surface Finishes

Science for Electroplaters
Electrodeposited Metals

Complete Contents Page 75

Read and pass on—

7 CLEPO PRODUCTS

Steel Electrocleaner
CLEPO 221-M

Zinc Base Electrocleaner and Surface Reconditioner
CLEPO 50-K

Buffing Compound Remover for All Metals
CLEPO 90-J

Typifying the BROAD CLEPO Service

Aluminum Deoxidant and Desmutter
CLEPO 180-S

Cleaner and Iron Phosphate Coating
CLEPO 196-F

Rust Preventive and Water-Displacing Solvent
CLEPO DUXBAK S

Burnishing Compound
CLEPO 202-S

SEVEN CLEPO PRODUCTS for SEVEN distinctly different types of work in the metal finishing industry. These represent a rough cross-section of the many, many, CLEPO materials used in American Industry today. Whether your problem is the cleaning of metal before electroplating, before painting, between manufacturing operations, or if your work requires barrel finishing, rust prevention, phosphate coating or aluminum welding, it is quite probable that there is a production-tested CLEPO material to suit your need.

CLEPO Field Service Men are available in many areas to help you in choosing the *right* material and method for your job and to show you how to get the best results for your money.

In addition to the standard CLEPO materials, our well equipped laboratories and technical staff stand ready to help you solve the unusual problems and to provide needed technical information.

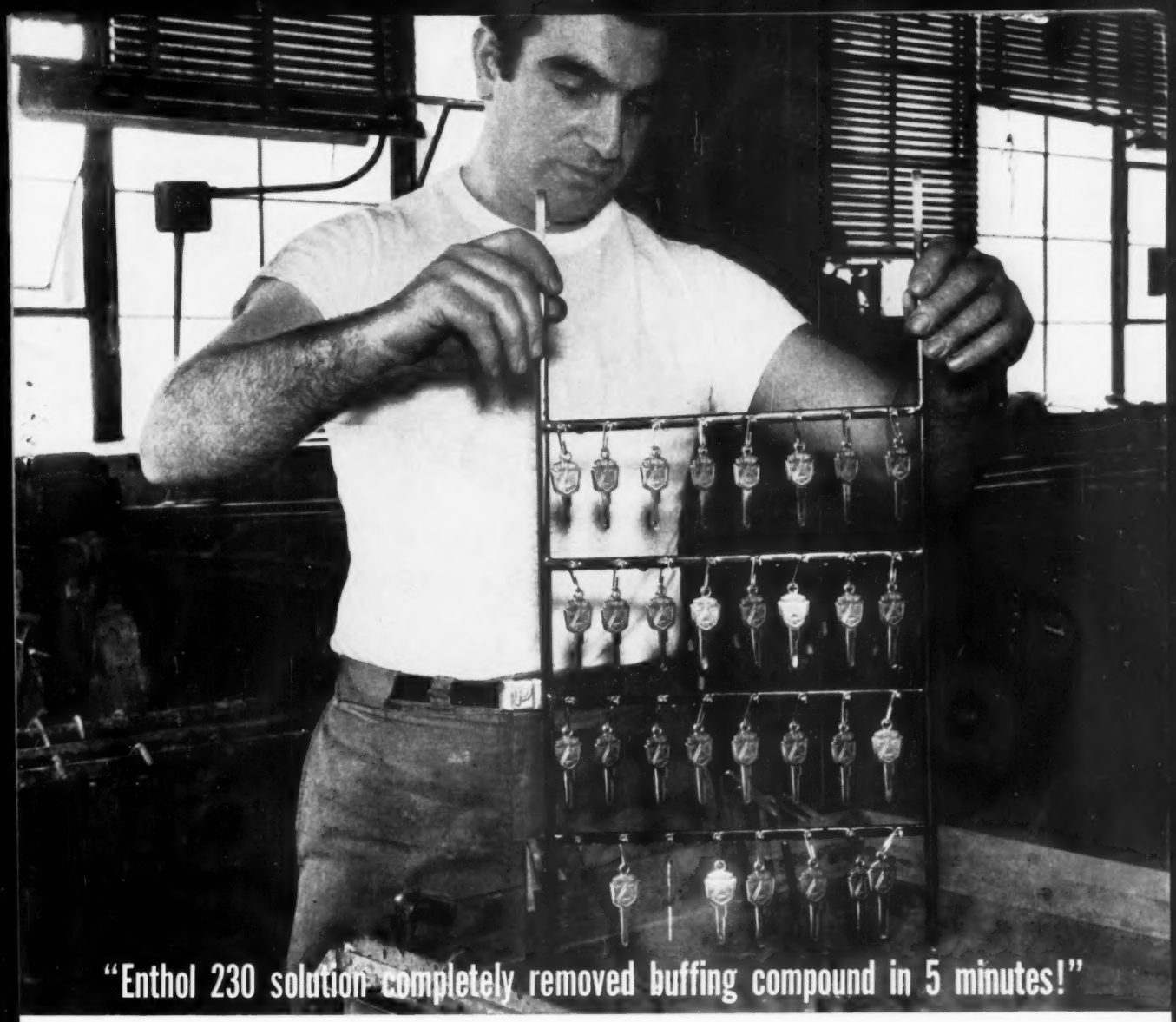
Finally, in order to provide the utmost in customer service, these CLEPO distributors are ready to help you too.

OUR DISTRIBUTORS TOO, ARE AT YOUR SERVICE

ALLIED PLATING SUPPLIES, Hialeah
BELKE MFG. CO., Chicago and Milwaukee
CHEMICAL SERVICES, INC., Atlanta
THE LEA MFG. CO., Waterbury
NATURAL PRODUCTS, Detroit
POL-O-PLATE PRODUCTS, Cleveland and Louisville

FREDERICK GUMM Chemical Company Inc.

538 FOREST STREET, KEARNY, N. J.



"Enthol 230 solution completely removed buffing compound in 5 minutes!"

At Regal Plating Company, Providence, R. I., these brass keys have just been soaked for 5 minutes in a 3.5% by volume solution of Enthol 230 at 180° F. Buffing compound packed in design work and crevices has been effectively dissolved away.

Regal joins a growing list of platers who have discovered the efficiency of new Enthol 230 in cleaning out the deep crevices, engravings, and filigree work in ornate costume jewelry. As for economy, Regal reports that an 85-gallon tank of cleaning solution required only 3 gallons of Enthol 230 for make-up and 1 gallon for replenishment over a 6 week period! The "ammonia wash" used previously, could not compete with this low operating cost.

Whatever your buffing compound removal problem, this new, mildly alkaline, liquid detergent should solve it. Enthol 230 solutions penetrate and dissolve even hardened buffing compounds, and, in many instances, have eliminated hand brushing of parts. The solutions have extremely long life and high tolerance to contamination by dissolved soils. Enthol 230 solutions can clean steel, zinc die castings, aluminum, copper, brass, white metal, lead, nickel plate, gold, and silver. They are excellent for use in ultrasonic cleaning. Write today for complete information, to Enthone, Inc., 442 Elm Street, New Haven, Conn.

ASARCO

ANOTHER PRODUCT OF *Enthonics* RESEARCH

ENTHONE

A Subsidiary of American Smelting and Refining Company

For top efficiency in tank cleaning

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 FIELD SERVICE MEN • OVER 160 MATERIALS

First choice in heavy-duty tank cleaning —hard-working Oakite "24"

Users everywhere agree that their best way to clean iron and steel parts is to tank-soak them in a hot solution of heavy-duty Oakite 24. This hard-working alkaline cleaner gets under the dirt layers and literally tears the soil from the surface. Despite excessive soil contamination of solution Oakite 24 maintains proper pH level and provides long, effective cleaning action.

Oakite 24 is but one of a wide range of alkaline tank-cleaning compounds. Others include medium and light duty oil and grease removers; self-emulsifying solvent cleaners specially designed for removing buffing compound residues, pigmented drawing compounds and other tenacious burned-on solid-particle dirts and smuts. Also available is a useful selection of materials for cleaning brass, copper, aluminum, magnesium, lead, tin and zinc.

Which is best for you? Only you and the Oakite man together can decide. It depends on your equipment, the parts you process, the next production step. Ask the Oakite man. From over 30 materials, you're *sure* to get the one cleaner that works most efficiently for you. Write for Bulletins. Oakite Products, Inc., 38H Rector Street, New York 6, N. Y.

it PAYS to ask Oakite

OAKITE

50 *1909-1959* SCIENCE

years' leadership in industrial cleaning

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SECOND CLASS POSTAGE PAID at the Post Office in Westwood, N. J. and New York, N. Y. Volume 57, No. 6, June, 1959. Five dollars per year.

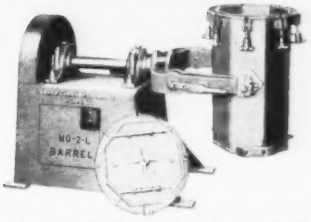
61 . . . . for 61 years!

Manufacturing Reliance Plating, Polishing Equipment, Supplies for Better and More Profitable Metal Finishing

Chas. F. L'Hommedieu & Sons Co.

No. 18 — VARIABLE SPEED POLISHING LATHE

Independent spindles—each with separate patented Variable Speed Drive and controls — ball-bearing throughout. Powered by two up to 25 H.P. motors. Adopted by leading manufacturers as standard equipment.

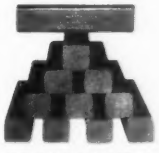


TYPE L — DOUBLE ACTION BARREL
For ABRASIVE TUMBLING or BALL BURNISHING

The cylinder can be operated at an angle for producing a double tumbling action—thus producing a better and more uniform finish in a much shorter time.

Longer pieces finished more uniformly and without bending.

RELIANCE KUL-KUT BUFFS
FOR FAST CUTTING



RELIANCE EXTRUDED COMPOSITIONS
STANDARD SIZE
2 x 2 x 10"

THEY CUT • THEY CLEAN • THEY COLOR

- **DURABILITY**
- **PRODUCTION**
- **ECONOMY**
- **EFFICIENCY**

THE ANSWER TO INCREASED PRODUCTION AT LOWER COST!

Manufacturers of Metal Finishing Equipment and Supplies

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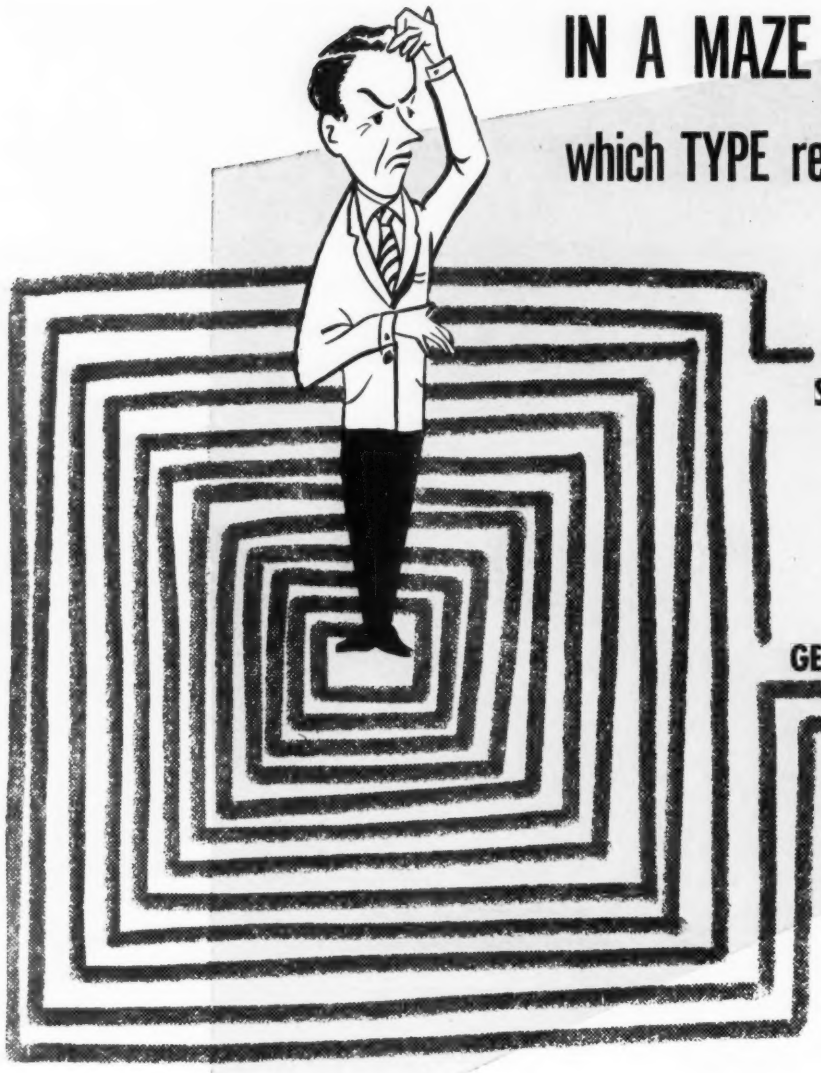


IN A MAZE when deciding which TYPE rectifier to buy?

SELENIUM

GERMANIUM

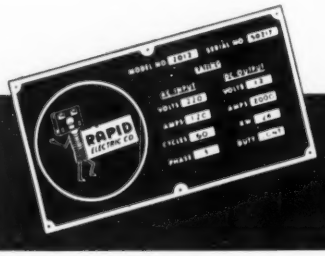
SILICON

Get first hand information at the 5th Industrial Exposition June 16-19 Booths 76 & 77C

Why not call RAPID'S engineering department with your power requirements. Let us match your requirements with the right type rectifier.

Because each semi-conductor has advantages to offer, and because RAPID supplies *all three*, you can be certain of obtaining sound technical advice.

Call TA 8-2200 for reliable technical service.

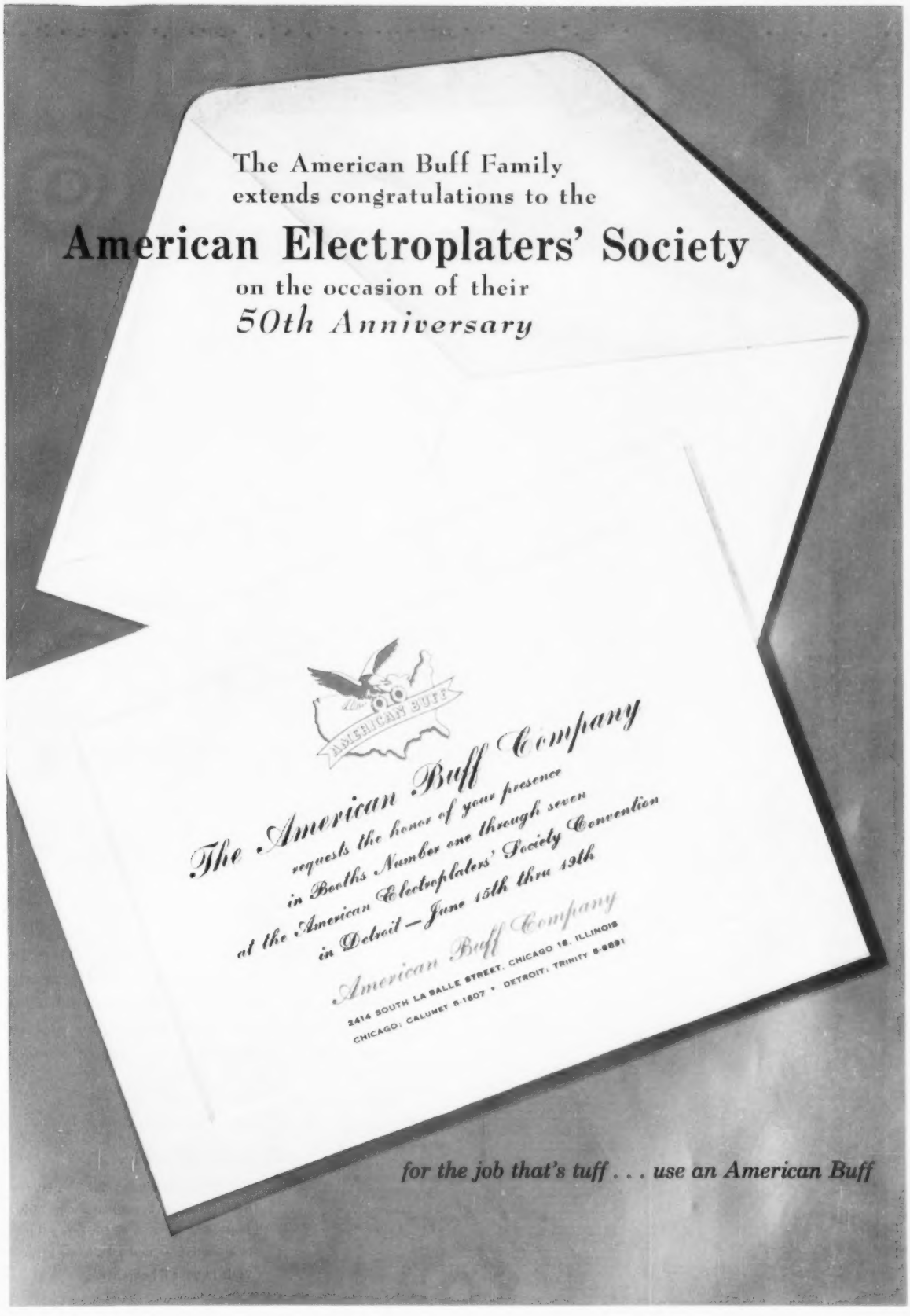


THE NAMEPLATE THAT MEANS *"More Power to You!"*

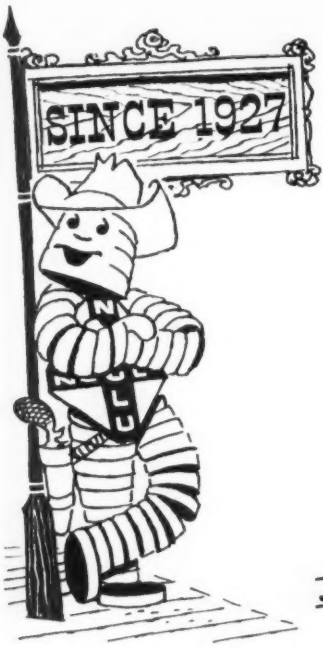
RAPID ELECTRIC COMPANY

12838 Fenkell Avenue • Detroit 27, Mich. • Diamond 1-8537

2881 Middletown Road • New York 61, N. Y. • TAlmadge 8-2200


The American Buff Family
extends congratulations to the
American Electroplaters' Society
on the occasion of their
50th Anniversary
The American Buff Company
requests the honor of your presence
in Booths Number one through seven
at the American Electroplaters' Society Convention
in Detroit—June 15th thru 19th
American Buff Company
2414 SOUTH LA SALLE STREET, CHICAGO 16, ILLINOIS
CHICAGO: CALUMET 5-1607 • DETROIT: TRINITY 5-5691
for the job that's tuff . . . use an American Buff

HAVE GUNS
. . . HAVE TRAVELLED!



. . . . . and still travelling. Since 1927 J. J. Siefen has been servicing and contributing to the metal finishing field. Today J. J. Siefen Stainless Steel, Tripoli, and Nuglu Compounds lead the market. In conjunction with J. J. Siefen Products, J. J. Siefen Finishing Systems offer all the equipment to facilitate the finest workmanship at a reasonable cost. J. J. Siefen's specialized engineering service combined with precision and skill in compounds and production allow J. J. Siefen Engineers to give individual attention to the unique specifications of their customers. Your inquiries concerning any problems you may have in the metal finishing field are invited.

Since 1927-A Leader In NATION WIDE Finishing Systems

J. J. Siefen CO.

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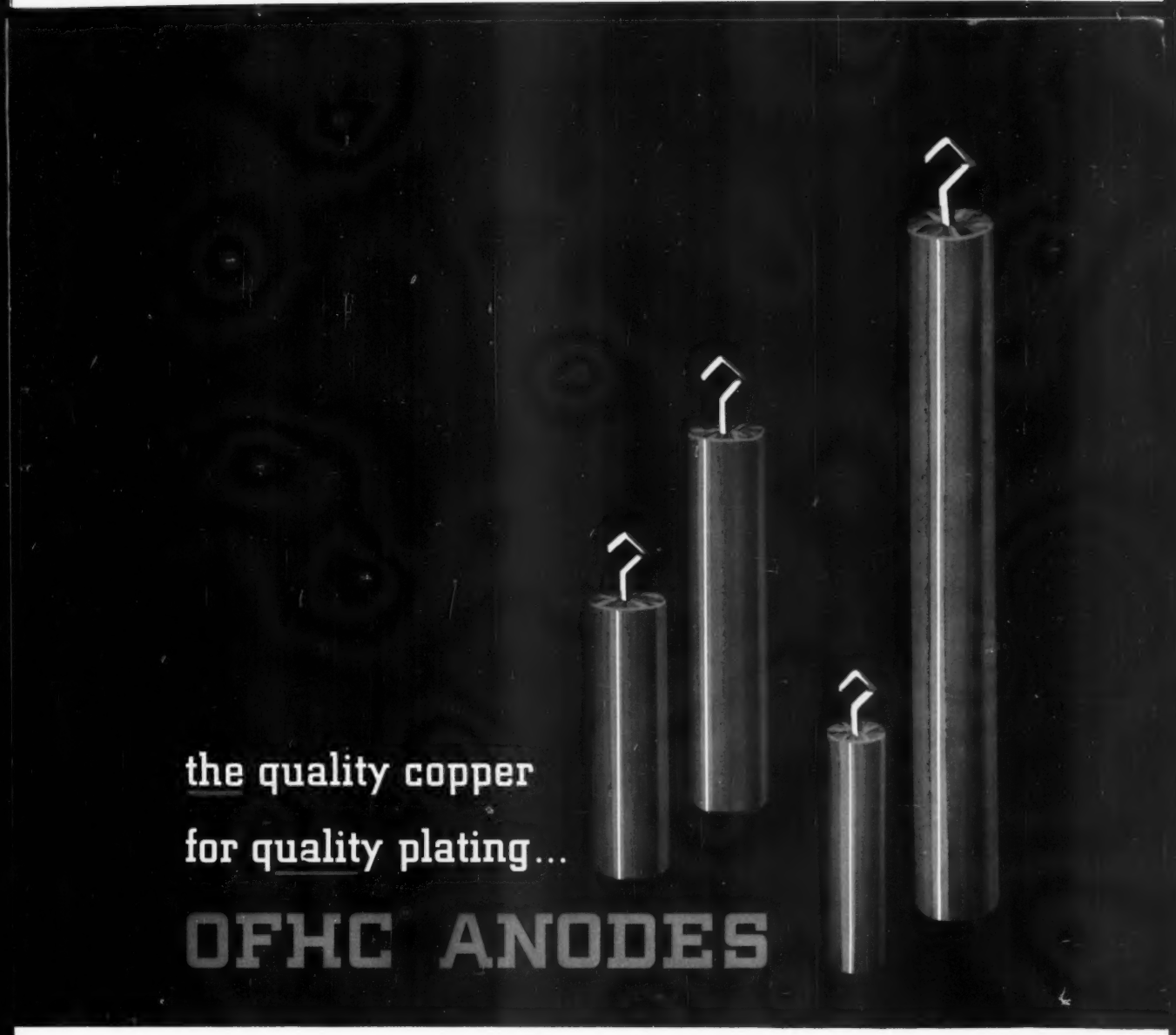
SEE OUR BOOTH . . .

Visit our booth during the Fifth Industrial Finishing Exposition June 15th-June 19th. See J. J. Siefen Spray Guns in operation — and take home a souvenir to your li'l pardner.



Smoother, denser, more uniform finishes are obtained easily with OFHC Anodes, made from the purest copper commercially produced. OFHC brand quality means low porosity, excellent grain structure, top anode efficiency in both acid and cyanide baths.

OFHC Anodes are an example of quality also meaning true economy. There's more *plating* copper per pound, bags and diaphragms are eliminated, scrap loss is reduced, and solution control is simplified.

For further information, visit the OFHC Anodes Exhibit at the Industrial Finishing Exposition, Booth 216A, or write today.

AMERICAN METAL CLIMAX, INC.

61 Broadway, New York 6, N. Y.

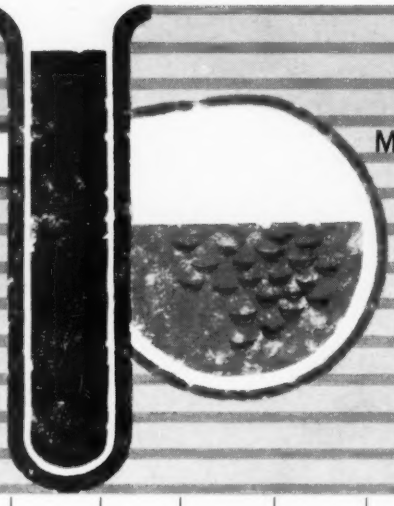
AMAX

OFHC Anodes—Made Only by American Metal Climax—are Sold by Leading Plating-Supply Distributors Everywhere.

EFFECTIVE

Pfizer

CHEMICALS FOR METAL FINISHING



PLATING
DE-RUSTING
METAL CLEANING
ALUMINUM
ETCHING AND
COLORING

	Cleaning	Polishing	Pickling	Electroplating	Electropolishing	Non-Electrolytic Depositions	Electrolytic Oxidation	Etching	Gold Coloring of Aluminum
Citric Acid	✓	✓	✓	✓	✓	✓	✓	✓	
Sodium Citrate	✓	✓*		✓		✓			
Ammonium Citrate	✓	✓	✓	✓					
Gluconic Acid	✓	✓	✓	✓				✓	
Glucono Delta Lactone	✓	✓	✓	✓				✓	
Sodium Gluconate	✓	✓		✓				✓	
Oxalic Acid	✓	✓	✓	✓	✓		✓	✓	
Ammonium Oxalate	✓	✓		✓					
Ferric Ammonium Oxalate									✓
Tartaric Acid	✓		✓	✓				✓	
Tartar Emetic				✓					
Rochelle Salt			✓	✓					
Cream of Tartar	✓			✓					

Citric Acid...
Nontoxic, mild, yet chemically active against scale and tarnish. Used extensively in the formulation of general metal cleaners and polishes, particularly household products.

Sodium Citrate...
A preferred ingredient in electroless nickel baths, resulting in a brighter plate. Also finds wide use in electroplating processes.

Ammonium Citrate...
Especially useful for the removal of rust in near neutral solutions. Extremely mild and safe to handle.

Gluconic Acid...
An excellent sequesterant in alkaline derusting solutions; provides rust-free, clean surface ready for further treatment. Also highly effective in aluminum etching and paint stripping compounds.

Oxalic Acid...
The most effective chemical for use in automobile radiator cleaners. Also finds wide use in electropolishing and as an ingredient in general metal cleaners.

Ferric Ammonium Oxalate...
Used extensively in the production of light-fast gold colored aluminum.

Tartaric Acid...
Excellent complexing agent for copper in electroplating.

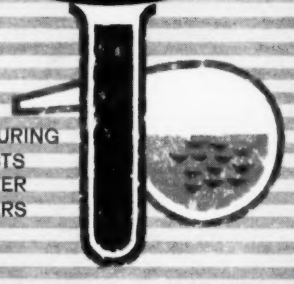
Tartar Emetic...
Used in electrolytic baths for deposition of silver and antimony alloys on brass, copper and steel surfaces.

Rochelle Salt...
Increases efficiency and yields finer-grain deposit in alkaline copper plating.

Cream of Tartar...
An excellent additive for brass cleaning compounds. Its crystalline structure acts as an effective abrasive in paste polishes. Chemically active against tarnish.

SCIENCE FOR THE WORLD'S WELL-BEING...

Pfizer



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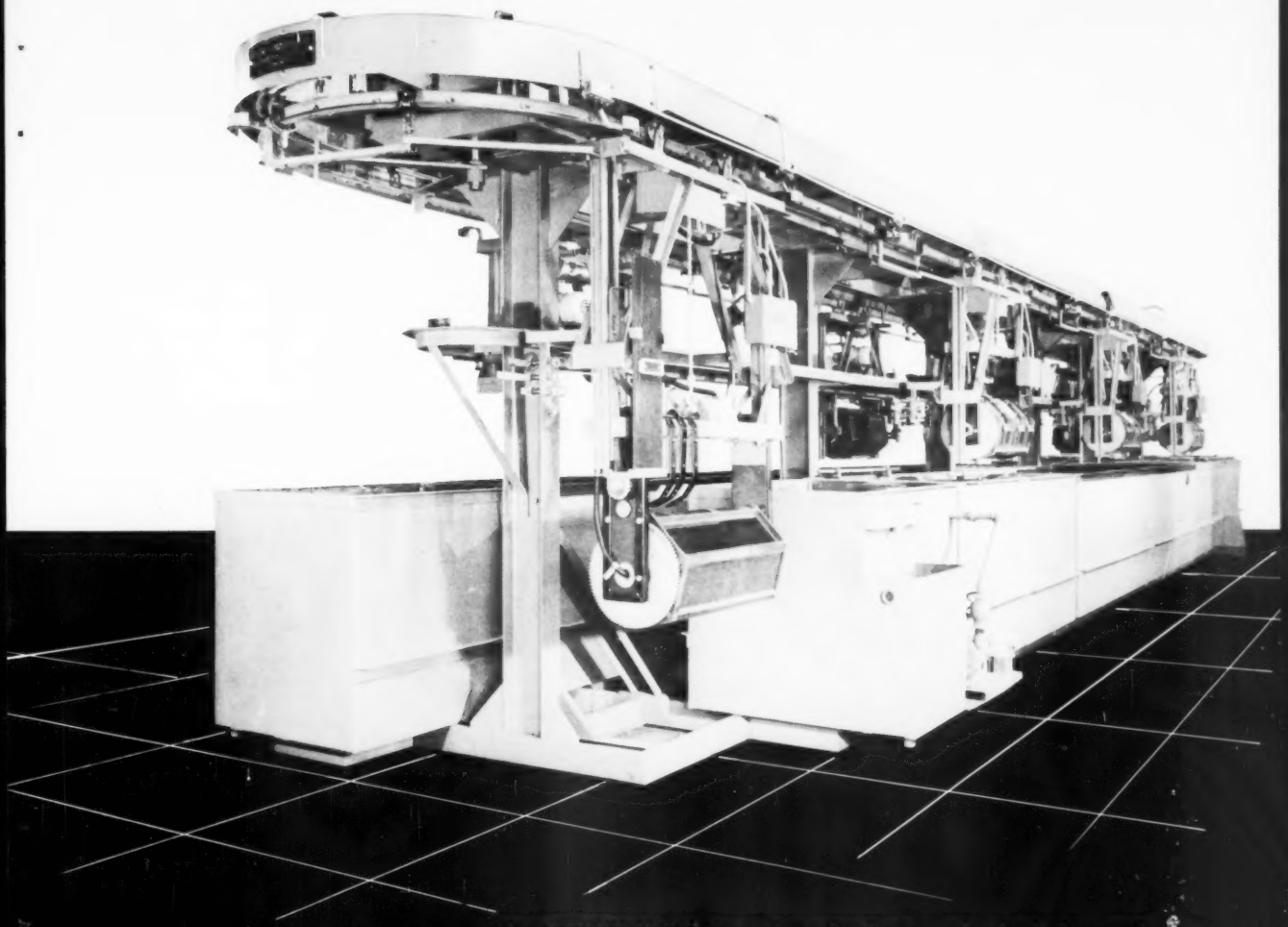
Chas. Pfizer & Co., Inc.
CHEMICAL SALES DIVISION
630 Flushing Avenue, Brooklyn 6, N.Y.
Branch offices:
Chicago, Ill.; Clifton, N. J.; San Francisco, Calif.;
Atlanta, Ga.; Dallas, Tex., Montreal, Canada

OFHC Anodes—Made Only by American Metal Climax—are Sold by Leading Plating-Supply Distributors Everywhere.)

CROWN "M-P" MULTI-PURPOSE
AUTOMATIC PROCESSING CONVEYOR



The CROWN M-P Automatic embodies new basic design and electrical controls that achieve a wide range and variety of skips—dips—delays plus selection of 2- 3 or 4 different thickness of plate. These selective variables can be combined with multiple plating such as cadmium or nickel—chrome, etc.

The CROWN M-P is so versatile that practically any dip processing requirement can be accomplished.

CROWN

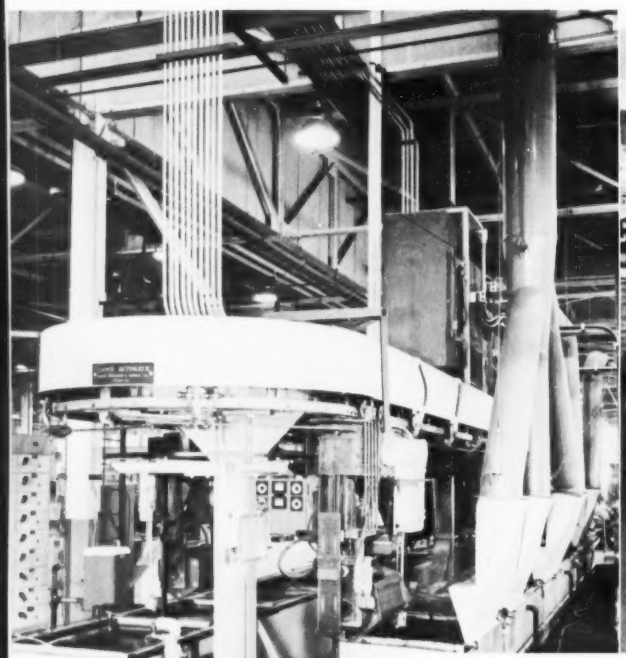
Crown Rheostat and Supply Company

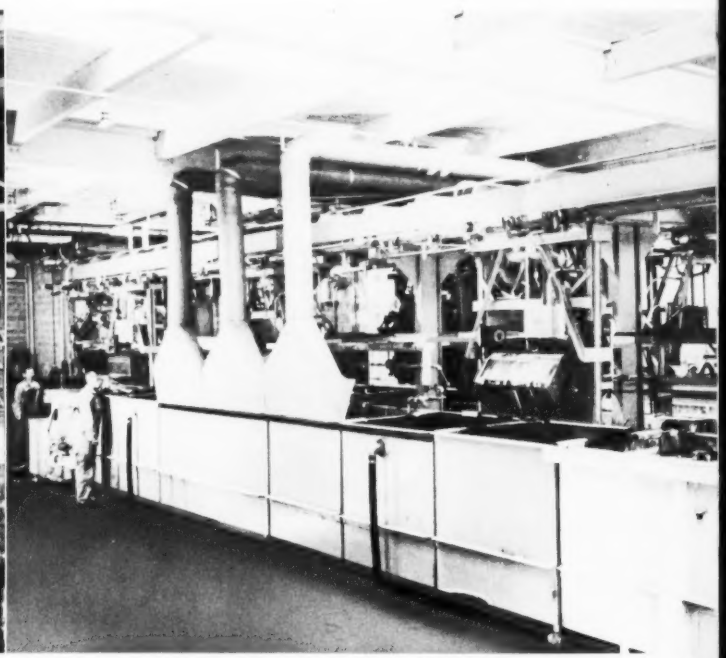
1965 PRATT BOULEVARD • ELK GROVE VILLAGE, ILLINOIS • (A SUBURB OF CHICAGO)

You can add versatility to automatic processing.....

Crown M-P (Multi Purpose) Conveyors are a new development in basic design and control that brings automatic dipping processing to all industry for multi cycle processing in plating—anodizing—painting—phosphatizing and rubber dipping operations. Using the basic "M-P" concept, machines can be built to meet your specific requirements by incorporating one or several of these important Crown features:

- **Each carrier can be set for one of several cycles.**
- **One machine can plate two or three different metals.**
- **Horizontal and oblique barrels and even racks can operate on the same machine.**
- **Rack and barrel work can be plated at two different voltages on one machine.**
- **Work can be plated at four different thicknesses at the same time.**
- **Parts can vary from ¼ inch to 40 feet in length.**
- **Weight of work per station from ten to three thousand pounds.**
- **Lifts from 12 inches or even less up to 12 feet.**
- **Rotation, tilting, or auxiliary motion during transfer.**
- **Selection of cycles by automatic programming or by manual setting.**
- **Machines of this type have been running in actual production for over 2 years.**

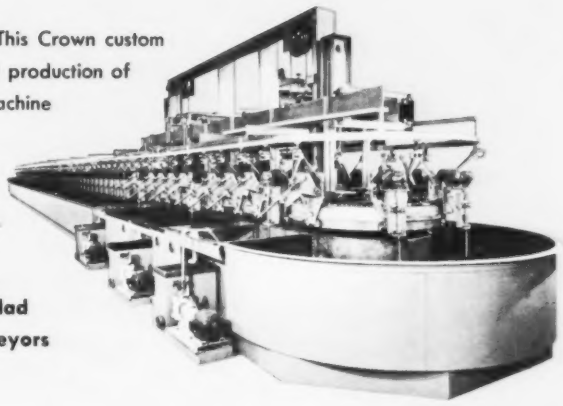




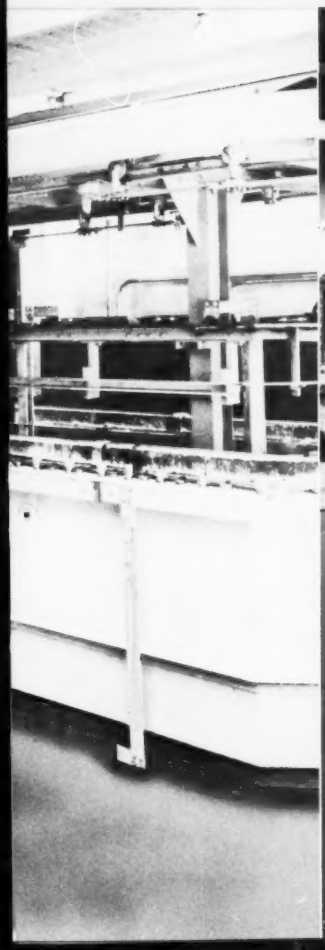
For over two years, with one operator, these CROWN M-P return type fully automatic barrel plating machines have been producing specification plating. One, two, three or four selections of plating thickness can be run at the same time. Multiple selection to vary cleaning—acid and dips, etc. At the loading station, operator sets the individual carrier for its cycle and treatment. What are YOUR requirements?

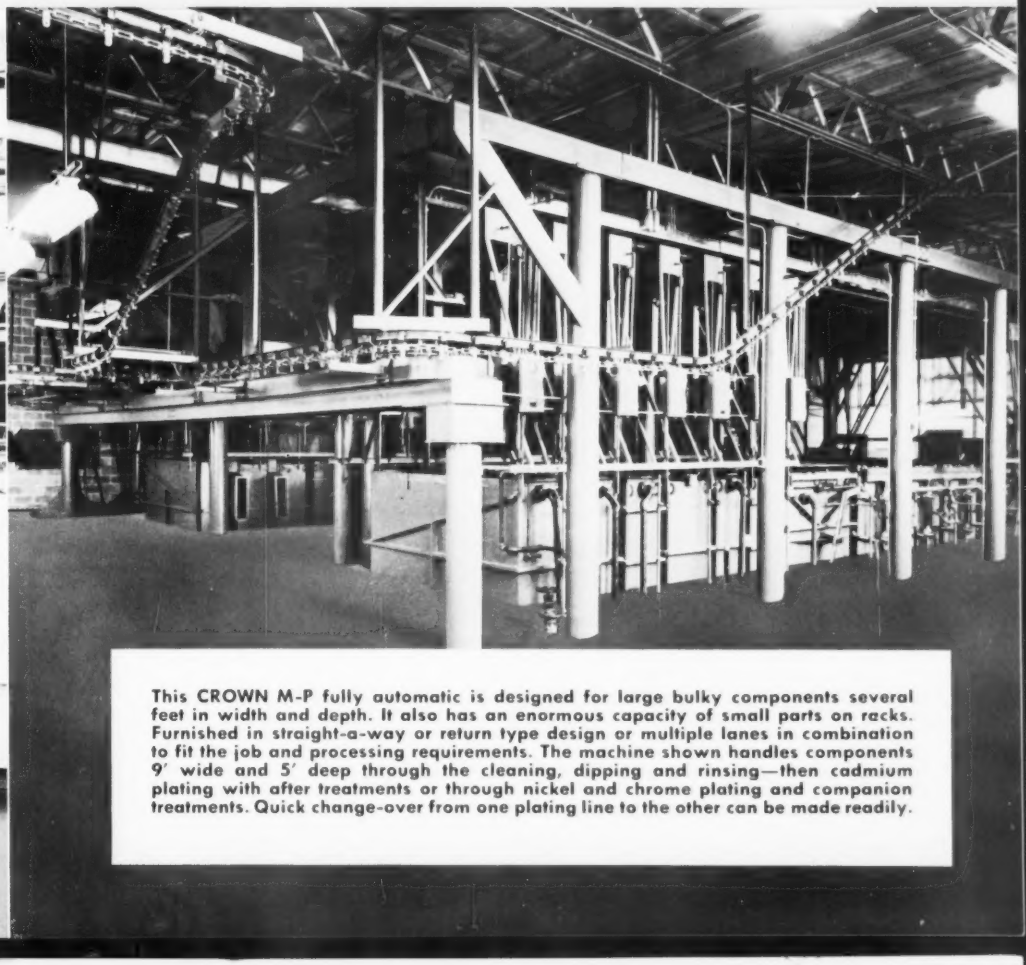
.....with Crown's up-to-date "M-P" machines and modern control systems

Crown Fully Automatic Special Processing Machine—This Crown custom designed machine meets requirements for handling quantity production of special size and shaped parts. Shown is a fully automatic machine with individually rotating spindles which pivot and tilt in transferring work from tank to tank.

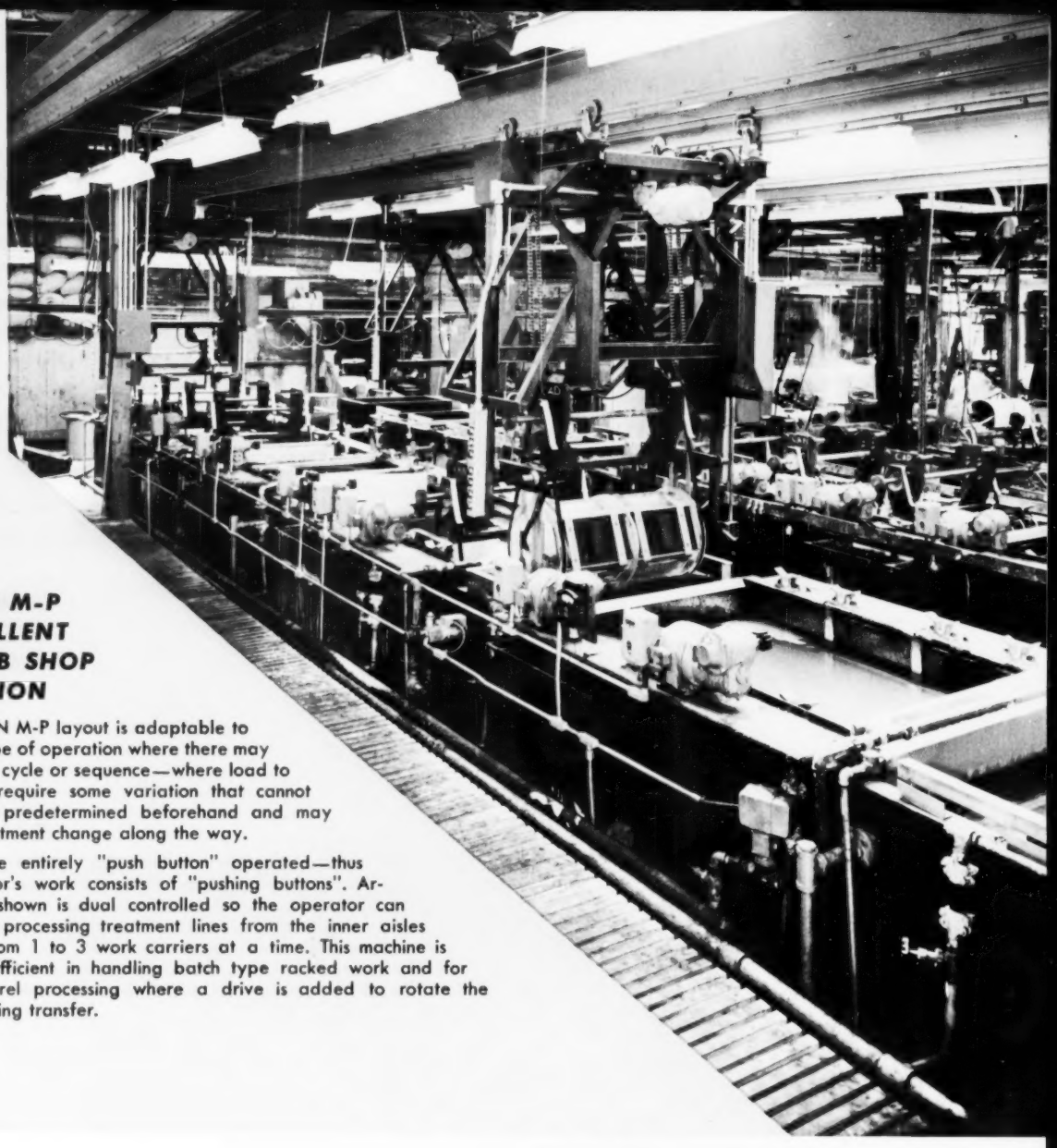


If you have processing requirements involving multiple treatments and will furnish us with the size of the parts, production required, and the cycle of treatment, together with any special features wanted, we will be glad to study your problems and show you how MP conveyors can save you money.





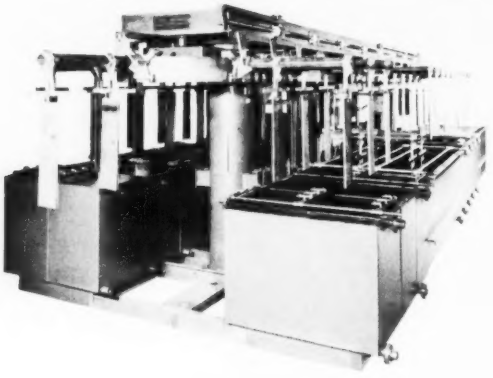
This CROWN M-P fully automatic is designed for large bulky components several feet in width and depth. It also has an enormous capacity of small parts on racks. Furnished in straight-a-way or return type design or multiple lanes in combination to fit the job and processing requirements. The machine shown handles components 9′ wide and 5′ deep through the cleaning, dipping and rinsing—then cadmium plating with after treatments or through nickel and chrome plating and companion treatments. Quick change-over from one plating line to the other can be made readily.



CROWN M-P IS EXCELLENT FOR JOB SHOP OPERATION

This CROWN M-P layout is adaptable to job shop type of operation where there may be no fixed cycle or sequence—where load to load may require some variation that cannot always be predetermined beforehand and may need a treatment change along the way.

Carriers are entirely "push button" operated—thus the operator's work consists of "pushing buttons". Arrangement shown is dual controlled so the operator can handle two processing treatment lines from the inner aisles and also from 1 to 3 work carriers at a time. This machine is especially efficient in handling batch type racked work and for plating barrel processing where a drive is added to rotate the cylinder during transfer.



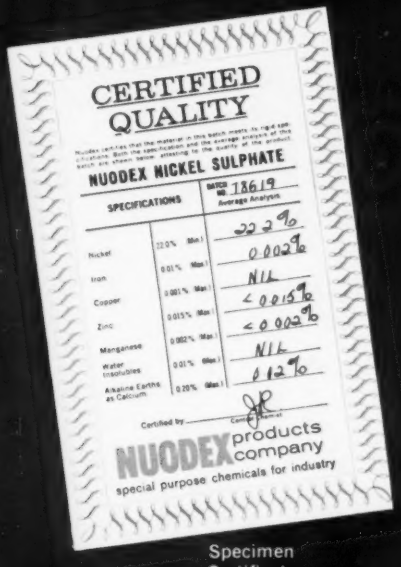
The CROWN Type D Machine is in use in many conventional plating operations—this rugged Automatic machine fits into a wide variety of plating and dipping processing cycles—a modern, versatile labor saver and cost reducing automatic machine

CROWN

CROWN RHEOSTAT AND SUPPLY COMPANY • 1965 Pratt Boulevard • Elk Grove Village, Illinois

Printed in U.S.A. • May, 1959

The most important benefit in plating today


CERTIFIED QUALITY

NUODEX NICKEL SULPHATE

SPECIFICATIONS		DATED NO. 18619 Average Analysis
Nickel	22.0% Min.	22.2%
Iron	0.01% Max.	0.002%
Copper	0.001% Max.	NIL
Zinc	0.015% Max.	< 0.015%
Manganese	0.002% Max.	< 0.002%
Water Insolubles	0.01% Max.	NIL
Alkaline Earths as Calcium	0.20% Max.	0.12%

Certified by _____ Control Chemist

NUODEX products company
special purpose chemicals for industry

Specimen Certificate

Every package of Nuodex Nickel Plating Chemicals bears a signed certificate with complete specifications and exact analysis. There's no doubt about it. Only Nuodex gives you this assurance of consistent high quality and purity. Buy the best . . . it costs no more.

NICKEL SULPHATE • CHLORIDE • CARBONATE

Also available—**Nickel Acetate • Formate • Nitrate**

Sold exclusively through leading suppliers of plating chemicals. Write for the name and address of the one nearest you.

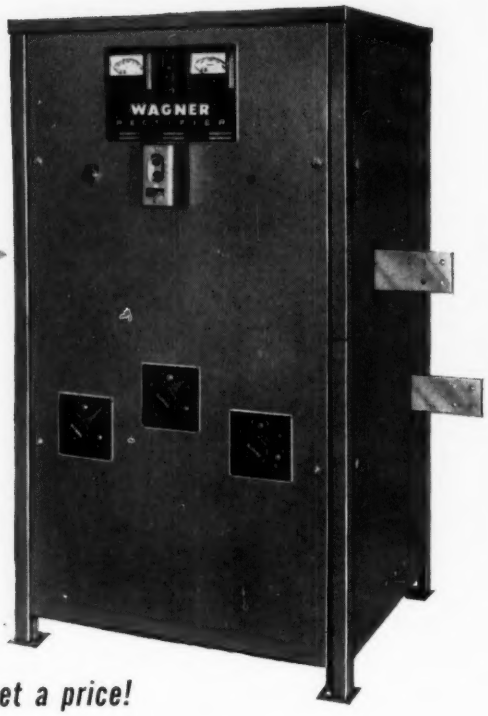
NUODEX special purpose chemicals for industry

NUODEX PRODUCTS COMPANY • ELIZABETH, NEW JERSEY

A Division of Heyden Newport Chemical Corporation

Fungicides • Nickel Salts • Organic Peroxides • Paint Additives • Stearates • Vinyl Additives

LOOK FOR THE DIAMONDS—SIGN OF FINISHING QUALITY



WAGNER

Process Engineered
SILICON RECTIFIERS

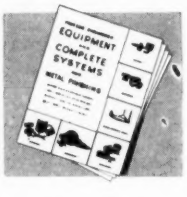
Designed to match a process—not to meet a price!

Wagner Rectifiers are process engineered . . . designed to give uninterrupted power that correctly matches your particular process, thus assuring highest efficiency from both the equipment and process.

In addition to this basic process-engineered design, Wagner Rectifiers have important engineering features which make them far superior to anything on the market . . . yet they are priced competitive to comparable quality.

INSIST ON THESE 5 WAGNER FEATURES IN YOUR NEXT RECTIFIER:

1. **CUSTOM BUILT**—to do more than just meet your routine power needs . . . they're built to take the unexpected that occurs in every shop. Momentary extra heavy loads and short circuits are completely and harmlessly absorbed—without cell failure and without shortening rectifier life.
2. **MORE RECTIFICATION AREA**—twice the number of cells found in ordinary rectifiers, with each cell having over 2½ times the usual rectification area. This gives you a more uniform power supply . . . fewer operating troubles with maximum efficiency!
3. **UNIQUE COOLING SYSTEM**—a special-type blower and strategically located baffles force pressurized air directly across the cells, assuring longer cell life and highest possible cell efficiency.
4. **OVERLOAD PROTECTION**—our exclusive built-in protective devices shut down the rectifier before highly unusual overload or other dangerous situation causes damage to the cells.
5. **RUGGED COMPONENTS**—Wagner-built transformers have Class B insulation (inorganic materials) . . . exposed bus bars are silver plated . . . housings are ruggedly built . . . meters are shielded to protect their precision accuracy.



Wagner Silicon Rectifiers are available in capacities ranging from 500 to 50,000 amperes with full selection of controls for manual or automatic regulation. Wagner Selenium Rectifiers also available in the same range of capacities.

Ask your Allied Field Engineer about the many advanced features of Wagner Rectifiers and how they can benefit you in your operations. You'll find his name listed under "Plating Supplies" in the yellow pages. Or, write for FREE TECHNICAL DATA FILES.

Allied Research Products, Inc.

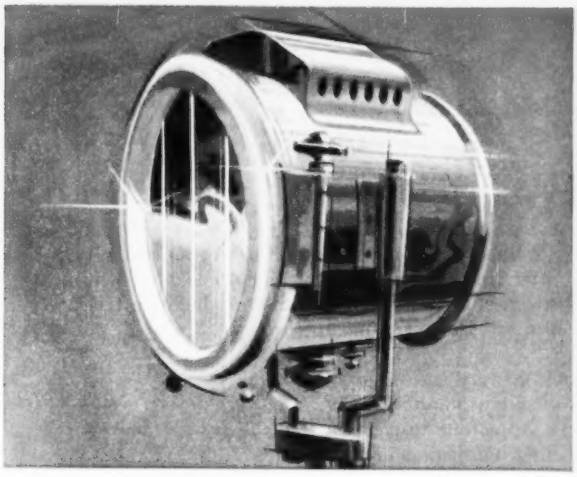
4004-06 EAST MONUMENT STREET • BALTIMORE 5, MARYLAND
BRANCH PLANT: 400 MIDLAND AVENUE • DETROIT 3, MICHIGAN
West Coast Licensee for Process Chemicals: L. H. Butcher Co.

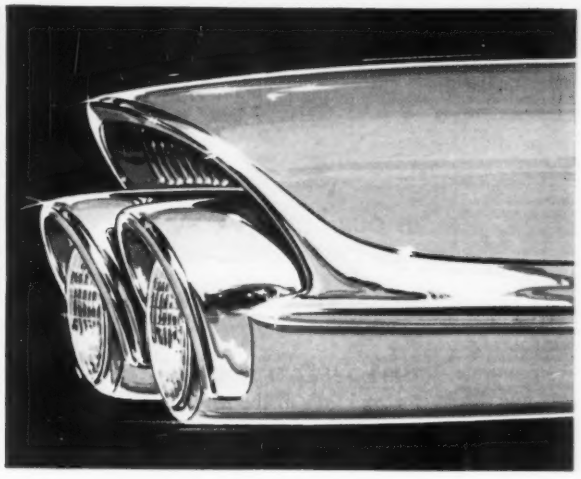
Chemical and Electrochemical Processes, Anodes, Rectifiers Equipment, and Supplies for Metal Finishing

IRIDITE® Chromate Coatings	IRILAC™ Clear Coatings	ISOBRITE® Plating Brighteners	ARP® Chemicals & Supplies	WAGNER Line of Equipment

Half a century apart . . .

both finished by Acme machines!





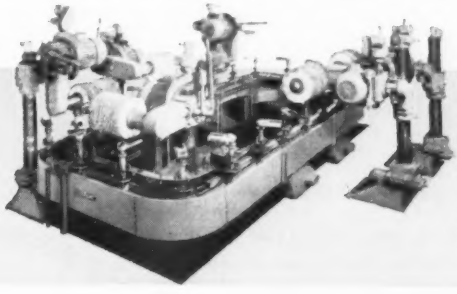
Even in 1910, part of an owner's pride in his car lay in gleaming brightwork. But polishing and buffing the shiny metal that he loved so well caused manufacturers plenty of headaches. And so they turned to Acme—and Acme has continued to supply the answers to their finishing problems.

Today, Acme engineers combine standard units with a variety of accessories to make custom polishing and buffing machines. Large corporations and small job shops alike use Acme machines to reduce rejects, increase production volume, machine finish odd-shaped pieces.

Every year of its history, Acme has encountered new finishing requirements—each an individual problem—and solved them. Chances are, we can solve your problem, too. Send for illustrated 16-page catalog today.

50 years of *Polishing Off* your finishing problems

OPEN HOUSE AT ACME DURING THE AES Convention IN DETROIT—JUNE 15 - 19—DON'T MISS IT!



Acme universal automatic polishing and buffing machine with camming and rotating fixture arrangement serving eight Acme adjustable heavy-duty buffing lathes having 24' wide wheels. Automatic wheel wear compensation is featured. Operation is finishing automotive taillight component.

ACME MANUFACTURING COMPANY

1400 E. 9 MILE ROAD, DETROIT 20, MICHIGAN

LEADING PRODUCERS OF AUTOMATIC POLISHING AND BUFFING EQUIPMENT SINCE 1910

UDYLITE
...to make your 1959

*in Detroit — the Statler Hilton Hotel

AT THE CONVENTION...

BE OUR GUEST! We invite you to join us as we resume two pleasant Udylite customs that have become AES Convention traditions over the past few years. You are most cordially invited to be our guests at Udylite's headquarters in the Statler Hilton Hotel and at Udylite plants in the Detroit area. We have arranged an entertainment schedule of which we trust you'll fully avail yourself during the Convention in Detroit, June 15 through 19.

THE UDYLITE HOSPITALITY CENTER. We look forward to seeing you for cocktails in the Michigan Room of the Statler Hilton on Monday, Tuesday and Thursday, June 15, 16 and 18 from four to six p.m. Sparkling entertainment will feature the two outstanding personalities of Jeanne Darr and Elena Santa.

Jeanne Darr, singing comedienne

Elena Santa, beauty keyed to music

THE UDYLITE—AES BALL

Carrying on another happy Udylite tradition, you are promised a memorable night's entertainment when we welcome you to the beautiful Terrace Room of the Statler Hilton. Detroit's most outstanding musical entertainment will be afforded by the nationally famous Singing Schoolteachers, the Fenby-Carr band.

The Terrace Room of the Statler Hilton in Detroit

The Fenby-Carr band, Detroit's famous Singing Schoolteachers

If you would make your 1959 AES Convention trip a complete success, you will not fail to join us for all four functions on the three days that highlight the Udylite social calendar. We look forward to seeing you.

world's largest plating supplier

GOES ALL OUT!
Convention* memorable

... Detroit Artillery Armory, June 15 thru June 19

AT THE EXPOSITION...

Be Sure to see the most fascinating and unusual display in the whole show, Udylite's unique presentation of its entire operation. And we really mean *unique;* nothing like this has ever been seen at any convention. You're sure to want to stop in at this first-time-anywhere exhibit every time you visit the Exposition Hall. AND there are some very special surprises waiting for you when you get there. Here also you will have an unparalleled opportunity to:

SEE Plating Automation in Operation . . . Udylite's sensational new V.I.P. single control conveyor.

SEE The Udylite Cyclemaster . . . greatest advance in fully automatic plating equipment today in action.

SEE The full story behind Udylite's vast million dollar research and experimental program at work for you.

SEE The complex Udylite electrical manufacturing assembly line producing a wide range of Udylite developed equipment.

SEE The Miracles of Project Alert in the revitalization of worn and obsolete equipment to save countless dollars for you.

SEE The whole Udylite production story . . . A specialized approach to the many problems of metal finishing.

Whatever else you do, DO NOT miss this unique Udylite presentation of the finest and most complete Research, Engineering and Manufacturing Facilities. Be sure to visit us during the convention June 15 thru 19.

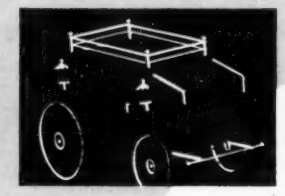
the **udylite** corporation

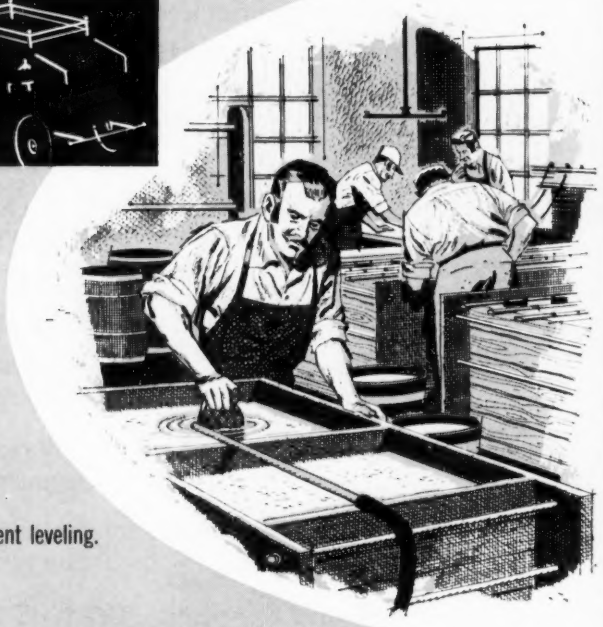
detroit 11, michigan

HARSHAW

60 years

THROUGHOUT THE PAST 60 YEARS, THE HARSHAW RESEARCH LABORATORIES HAVE PROVIDED MANY DEVELOPMENTS AND IMPROVEMENTS WHICH HAVE SERVED TO PROMOTE THE GROWTH OF THE ELECTROPLATING INDUSTRY. INCLUDED AMONG THESE MANY ADVANCEMENTS ARE THE FOLLOWING OUTSTANDING EXAMPLES:





1927 Rolled depolarized nickel anodes.

1934 NIBRITE...The first commercial bright nickel electroplating process accepted by the automotive industry.

1935 ACID TIN ADDITION AGENT developed.

1936 XXX CAST CARBON ANODES...This special composition carbonized nickel anode was developed for use in bright nickel solutions.

1937 METAL FLUOBORATES used commercially for electroplating.

1945 PERFLOW...The first truly leveling, sulfur free nickel deposit.

1946 GRANULAR NICKEL SALTS...fine crystal free flowing single nickel salts of high purity.

1952 PERGLOW...Outstanding bright nickel with excellent leveling.

1953 PERFLOW-PERGLOW DUPLEX Nickel plate with unmatched corrosion resistance.

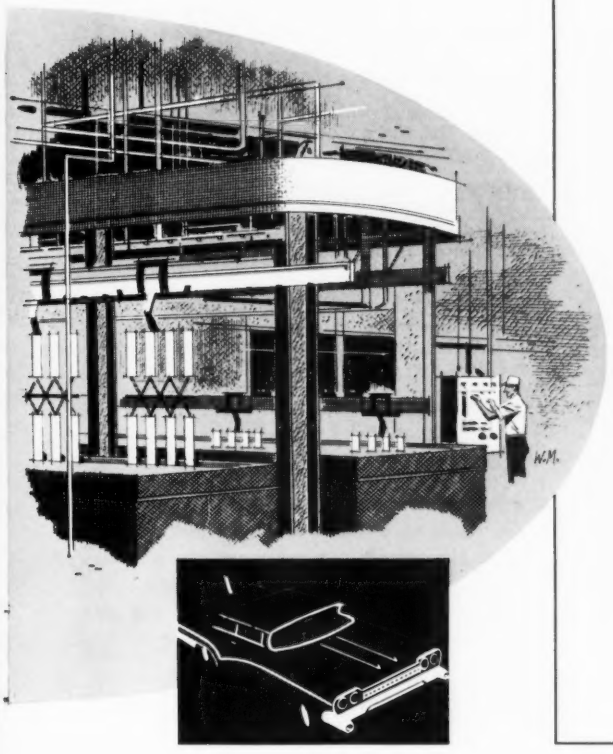
1955 AIR AGITATION...Adaptation for use in Harshaw nickel processes.

1958 CYNOREX COPPER...Exceptionally simplified bright cyanide copper process.

We will continue to offer platers complete service, including full programs of research and development in addition to complete plating processes, anodes, and chemicals

working for Platers

Nickel salts, nickel anodes, and cyanide of potash were Harshaw products produced for the Plating Industry as early as 1899. This modest beginning grew continuously to where our service to Platers includes full programs of research and development, many plating processes, and a complete line of chemicals and anodes. We will be happy to send further information on any of the items listed here—ask us for it.



HARSHAW PLATING PROCESSES:

Acid Tin
Tin Fluoborate
Lead Tin Alloy
Lead Fluoborate
Cadmium Fluoborate
Copper Fluoborate
Nickel Fluoborate
Cynorex Copper (High Speed Cyanide)
Cuprex Copper (Acid)
Perglow Bright Nickel
Nubrite Bright Nickel
Nubrite Bright Nickel (Air Agitated)
Airglow Bright Nickel
Modified XXX Bright Nickel
Perflow Semi-Bright Nickel
Perflow Semi-Bright Nickel (Air Agitated)
Perflow-Perglow Duplex Nickel
Lead — Tin Alloy Plating
Nibrite Barrel Nickel
Super Nibrite Barrel Nickel

CHEMICALS AND ANODES FOR MOST PLATING NEEDS:

Acid Tin Plating Addition Agent
Activated Carbon
Airglow Nickel Plating Addition Agents
Anocaps — Rubber Anode and Hook Protectors
Bags, Anode
Baskets, Anode
Boric Acid
Cadmium Ball Anodes
Cadmium Fluoborate
Cadmium Oxide
Cadmium Plating Addition Agent
Caustic Soda
Caustic Potash
Chromic Acid
Containers, Ball Anode
Copper Ball Anodes — Forged and Cast
Copper Cyanide
Copper Fluoborate
Cynorex Copper Plating Addition Agents
Cuprex Copper Plating Addition Agents
Filter Aid
Fluoboric Acid
Hydrofluoric Acid
Hydrofluosilicic Acid
Hooks, Anode
Lead and Lead Alloy Anodes
Lead Fluoborate
Lead Plating Addition Agents
Nibrite Barrel Nickel Plating Addition Agents
Nickel Acetate
Nickel Anodes — Rolled and Cast
Nickel Anodes — Toll Cast
Nickel Carbonate
Nickel Chloride
Nickel Formate
Nickel Fluoborate
Nickel Salts, Single
Nubrite Nickel Plating Addition Agents
Perflow Nickel Plating Addition Agents
Perglow Nickel Plating Addition Agents
Potassium Cyanide
Potassium Stannate
Rochelle Salts
Silver Cyanide
Sodium Cyanide
Sodium Stannate
Super Nibrite Barrel Nickel Plating Addition Agents
Tin Aluminum Alloy Anodes
Tin Anodes — Ball and Cast
Tin Chloride
Tin Fluoborate
Tin Sulfate
XXX Bright Nickel Plating Addition Agents
Zinc Anodes — Ball, Basket Type and Cast

THE HARSHAW CHEMICAL COMPANY

1945 EAST 97th STREET • CLEVELAND 6, OHIO

Chicago 32, Illinois • Cincinnati 13, Ohio • Cleveland 6, Ohio • Detroit 28, Michigan
Hastings-On-Hudson 6, N.Y. • Houston 11, Texas
Los Angeles 22, Calif. • Philadelphia 48, Pa. • Pittsburgh 22, Pa.

Congratulations to

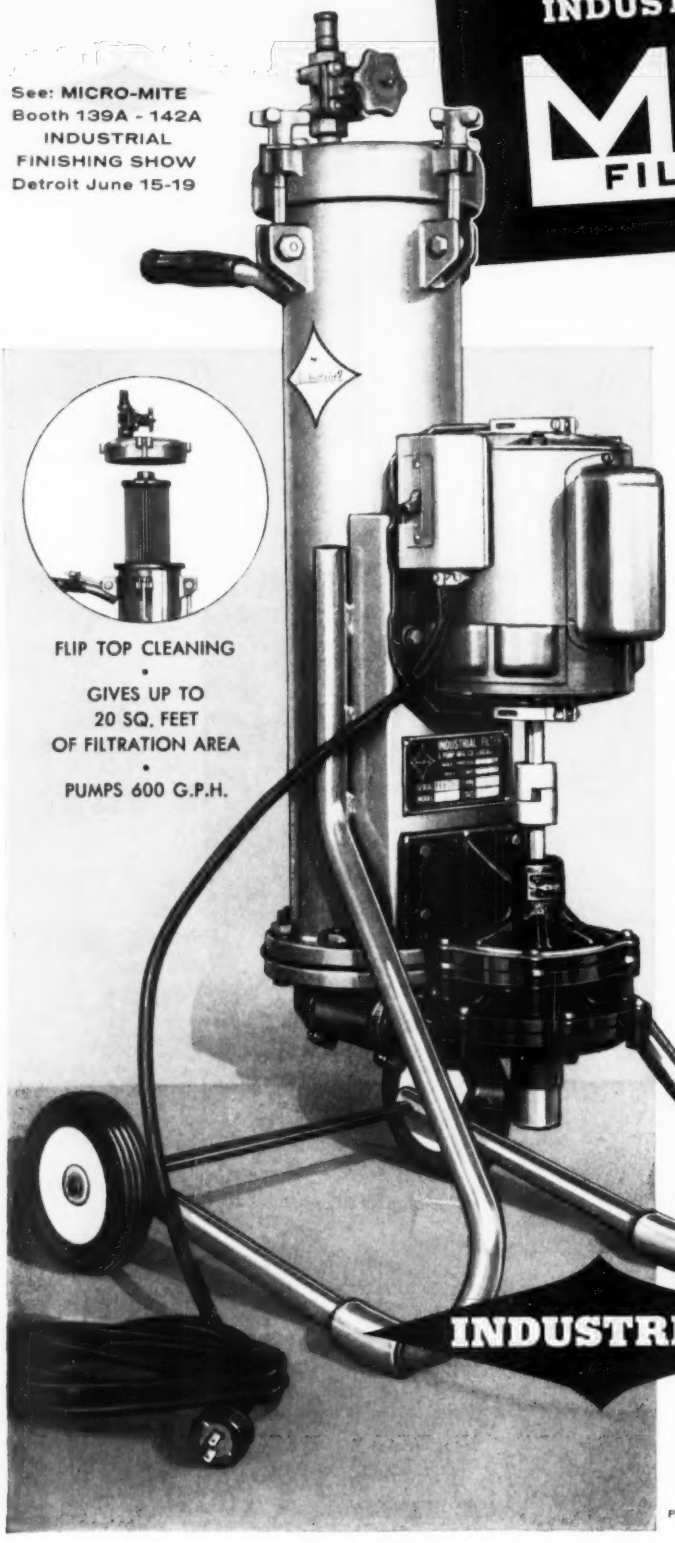
AES *on its 50th*

ANNIVERSARY

See: MICRO-MITE
Booth 139A - 142A
INDUSTRIAL
FINISHING SHOW
Detroit June 15-19

INDUSTRIAL'S
MICRO MITE
FILTER

100% Portable
to save you
✓money
✓time
✓space



Now you can eliminate the time and expense of bothersome re-piping as well as the need for space consuming separate stations for solution filtering. With Industrial's new low-cost Type 118 MICRO-MITE Portable Filter, you roll the filter to the tank—rather than pump the solution to the filter. Look what you get; look what you can *do*... then think what you *save* with this unique new solution filter.

COMPACT, but complete

Stands less than 45 inches, takes less than 3 sq. ft. of floor but offers 600 GPH of flow capacity—up to 20 sq. ft. of filtration area.

100% PORTABLE, but rigid

Rolls on 6" dia. rubber-tired wheels. Weighs but 140 lbs. *full*. Counter balanced design gives 4 point suspension, rigid work stability.

EASY, FAST to clean

Cover lifts off. Pull-out cartridge can be rinsed and replaced in minutes.

INTERCHANGEABLE for acid or akaline

Ease of cartridge change lets you switch from one solution to another, without bothersome flushing—in minutes, with MICRO-MITE.

CORROSION RESISTANT

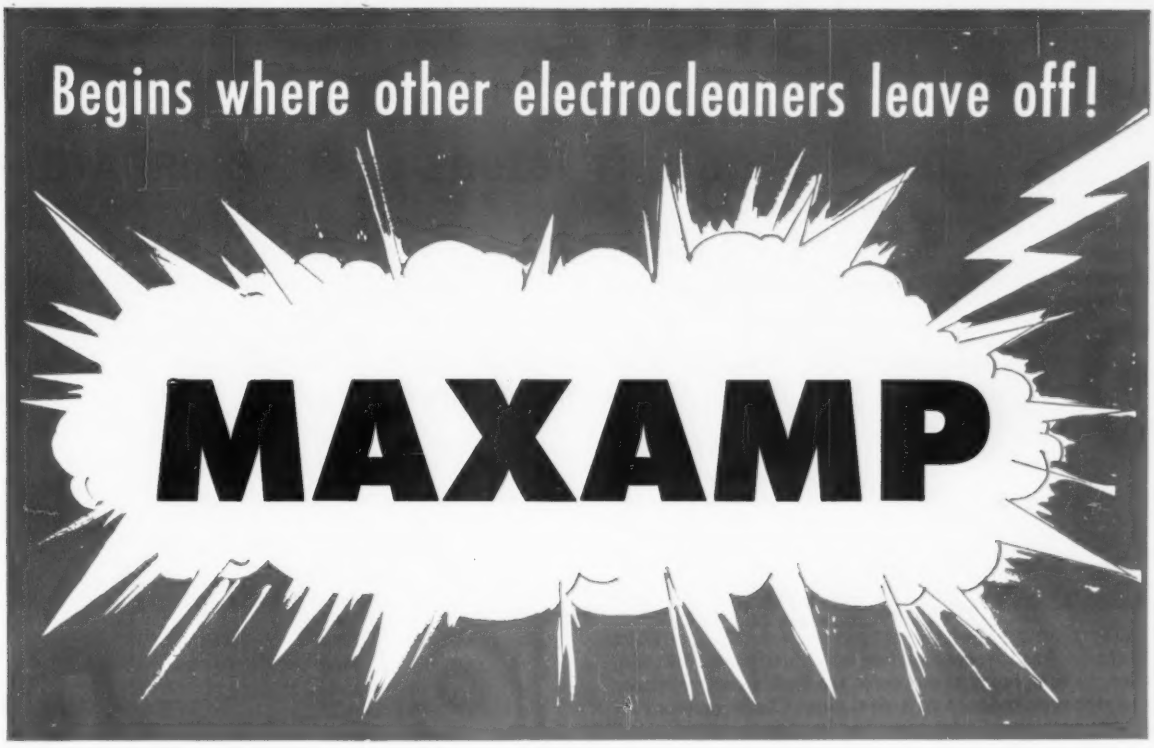
3 ply rubber on all connections. ¼" vulcanized rubber-lined steel casing. Components in PVC, Saran, Phenolic, Carpenter 20 or other special materials.

WRITE FOR BULLETIN ON MICRO-MITE

INDUSTRIAL FILTER & PUMP MFG. CO.

5906 Ogden Avenue,
Cicero 50, Illinois

P-159R



Wyandotte's amazing new development for steel electrocleaning!

Never before an electrocleaner like this! New MAXAMP delivers a new high in performance; brings you outstanding efficiencies never before possible.

MAXAMP's new and greater conductivity and maximum detergency handle those really tough jobs: stubborn smut, buffing and polishing compounds; phosphate coatings from drawing operations. Cleaning results are remarkable — your plating is mirror bright and stain free!

MAXAMP gives unequaled performance in handlines and automatics. Also important: MAXAMP is anhydrous, which means you buy *all cleaner*, no built-in water. Gives maximum results with minimum concentrations. And there's ideal foam control—no explosions, yet keeps fumes from escaping.

So, if you're interested in more efficient electrocleaning operations—and who isn't?—it'll pay you to investigate MAXAMP. It's the "new king of steel electrocleaners!" Call your Wyandotte representative for a demonstration, today! *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

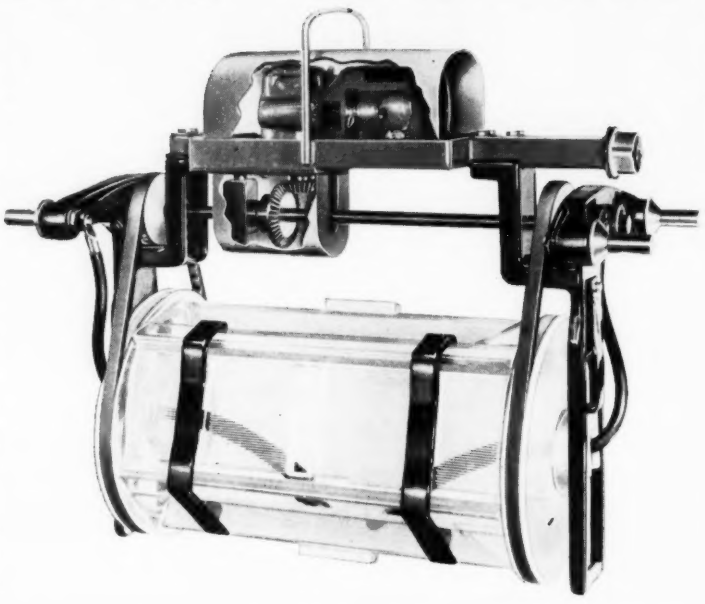
Wyandotte CHEMICALS

J. B. FORD DIVISION

THE BEST IN CHEMICAL PRODUCTS FOR METAL FINISHING

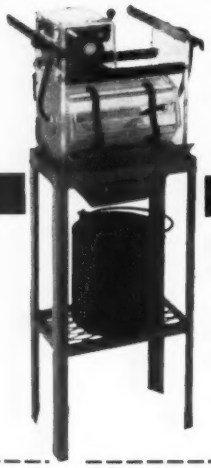
STUTZ presents a new design in PLATING BARRELS

Featuring
Motor drive integrally mounted
Complete cycle
Continuous rotation from one operation to the next
Cog belt cylinder drive
Positive grip one piece outboard mounted cog pulleys



The Stutz Co. has advanced plating barrel design and construction so that today these units are highly productive and maintenance reduced to a minimum. Costly replacement parts such as cylinder gears and bearings are eliminated completely. The only expendable parts are the belts. To provide long belt service, a special non-stretch cog belt with internal steel reinforcement is used. Belts can be changed, if necessary, in seconds at the tank without tools. The Stutz hanger extends below the cylinder thereby adding protection to the cylinder and also permitting the assembly to be lowered to the floor. The Stutz assembly incorporates a lock-in design that permits removal of the cylinder instantly from the hangers without the use of tools. This means cylinders with special perforations or partitions can be installed or removed quickly.

The motor-combined unit shown affords special economy since drives on tanks are not required, and rotation of the cylinder can be continued from one operation to the next. Solution dragout is therefore reduced to a minimum. This design is ideal for application on the carriers of a full automatic conveyorized plating machine.



The motor drive to the countershaft is through bevel gears operating in a gear case and permanently lubricated. Standard R.P.M. of the cylinder is 5; however, other speeds are obtainable at no extra cost. Hanger arms completely covered with fused plastisol.

The initial cost of belt driven units is substantially lower than gear driven barrels, and maintenance virtually eliminated.

"Motor Drive from Side of Tank Always Available."

Also Adaptable for Tanks Other Than Ours.

STUTZ *Portable Plating Barrels*

The Stutz Portable Barrel is made in 3 standard sizes with cylinders having inside dimensions of 6"x12", 8"x18" and 10"x18" I.D. Smaller upon application. Standard openings are 3/32". Smaller or larger openings can be furnished as required.

- Baskets in perforated metals or wire mesh.
- Load/Unload Stand for convenient and fast handling of work load.

Write for Catalog and Prices

SEE OUR EQUIPMENT ON EXHIBITION — BOOTH 257A AND 260A AT THE CONVENTION.

The STUTZ Company

We Invite your Inquiries

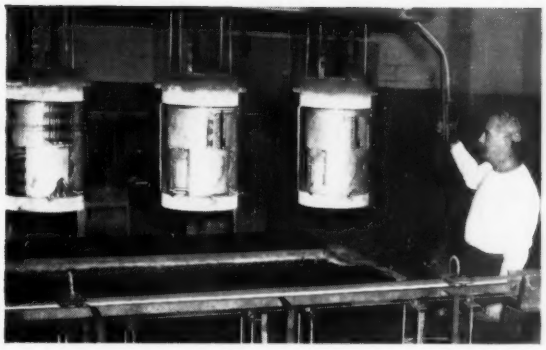
4420 West Carroll Ave. Chicago 24, Ill.

COMPLETE METAL FINISHING EQUIPMENT AND SUPPLIES

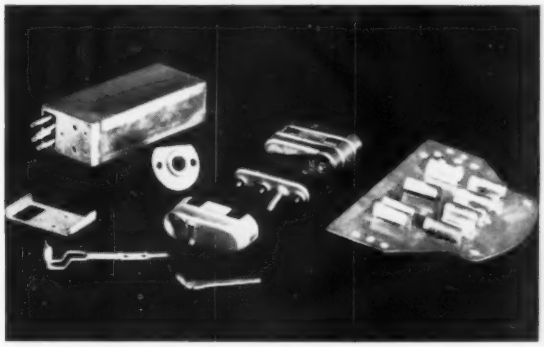
COST-CUTTING PLATING TECHNIQUES

STARRING B&A® metal fluoborates

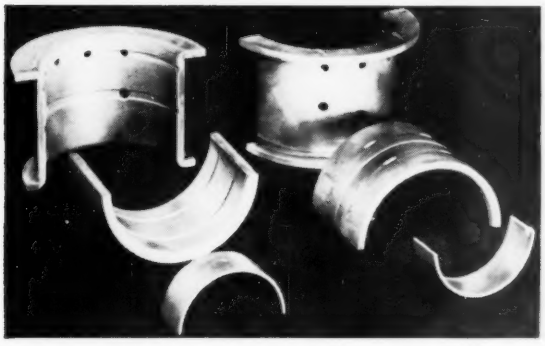
COPPER
IRON
LEAD
LEAD-TIN ALLOY
NICKEL
TIN



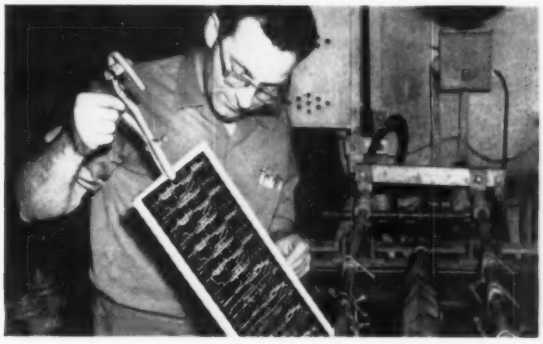
PLATING STEREOTYPES—B&A Nickel Fluoborates build up tough ductile deposits which, in some cases, have enabled stereotypes to run up over 3½ million impressions. They can deposit a nickel face of .0005 inch on the stereotype in 7.5 minute plating cycles . . . providing the high speed operation demanded by the printing industry.



PLATING RADIO AND ELECTRONIC PARTS—B&A Lead-Tin alloys with a high tin content produce non-corrosive coatings of excellent solderability which is not destroyed by long periods of storage before use. Lead-Tin alloy is also used for plating copper wire to produce a more uniform, more readily soldered product.



ENGINE PARTS—A tin-lead alloy of low tin content, plated from B&A fluoborate electrolyte, will provide good corrosion and wear resistance as well as superior lubricating properties to protect bearings, pistons and similar parts that require marginal lubrication during break-in periods.



PRINTED CIRCUITS—Low cost printed circuits are produced by using B&A Copper Fluoborate for high speed electroforming of thick, high quality circuits; followed by the use of B&A Lead-Tin Fluoborate to give a deposit that may be easily soldered.

IMPORTANT OPERATING ADVANTAGES:

The B&A Metal Fluoborates help you save time, money—get better plating results. They come in ready-to-use concentrated solution form . . . provide excellent bath stability, with minimum of sludging . . . have good covering power . . . give fine-grained deposits of good color . . . and allow ease of maintenance, since anode and cathode efficiencies approximate 100%.

WANT FURTHER INFORMATION?

Write us today for technical data on *your* application.

BAKER & ADAMSON®
Fine Chemicals

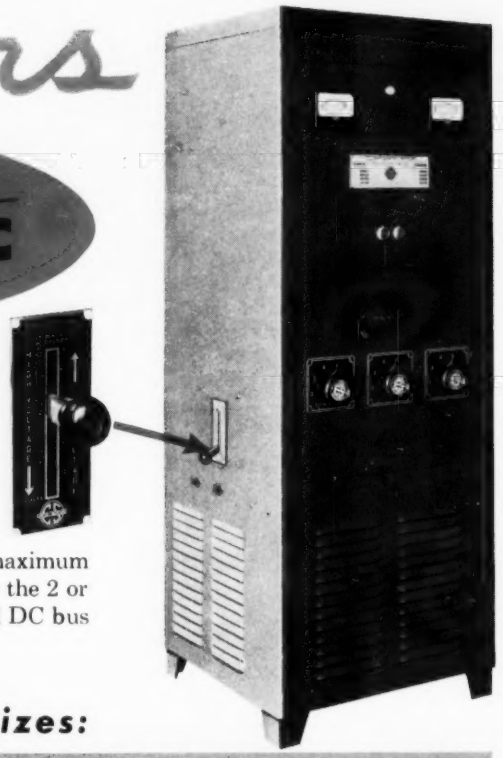
Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N.Y.

Clinton HEAVY DUTY Platers

WITH DUAL-O-MATIC CONTROL

U. S. PAT. OFF. NO. 660996



The "Dual-O-Matic" Transformer circuit manually operated from the Hi/Lo voltage selector switch was developed and perfected by our Rectifier Research Division. It is used exclusively in rectifiers manufactured by our company.

This new type transformer circuit is revolutionary in design and function as it permits the maximum name plate DC amperes rating to be drawn on either the 2 or 12 volt operating range without reconnecting external DC bus in series or parallel connection.

Available in the Following Sizes:

MODEL	DATA	PRICE F.O.B. CHICAGO	MODEL	DATA	PRICE F.O.B. CHICAGO
1012HO2	1000/1000 A 2-6/6-12 VDC	$1,195.00	4012HO2	4000/4000 A 2-6/6-12 VDC	$3,395.00
1512HO2	1500/1500 A 2-6/6-12 VDC	1,445.00	5012HO2	5000/5000 A 2-6/6-12 VDC	4,325.00
2012HO2	2000/2000 A 2-6/6-12 VDC	1,795.00	6012HO2	6000/6000 A 2-6/6-12 VDC	5,065.00
3012HO2	3000/3000 A 2-6/6-12 VDC	2,765.00	7512HO2	7500/7500 A 2-6/6-12 VDC	6,695.00
1018HO2	1000/1000 A 4-9/9-18 VDC	1,748.00	3018HO2	3000/3000 A 4-9/9-18 VDC	3,840.00
1518HO2	1500/1500 A 4-9/9-18 VDC	2,150.00	4018HO2	4000/4000 A 4-9/9-18 VDC	4,875.00
2018HO2	2000/2000 A 4-9/9-18 VDC	2,750.00	5018HO2	5000/5000 A 4-9/9-18 VDC	5,855.00
724HO2	750/750 A 6-12/12-24 VDC	1,865.00	2024HO2	2000/2000 A 6-12/12-24 VDC	3,165.00
1024HO2	1000/1000 A 6-12/12-24 VDC	2,095.00	3024HO2	3000/3000 A 6-12/12-24 VDC	4,665.00
1524HO2	1500/1500 A 6-12/12-24 VDC	2,525.00	4024HO2	4000/4000 A 6-12/12-24 VDC	6,075.00

A. C. Input—3 phase, 60 cycle, 220 or 440 volts. Specify line voltage when ordering.

Above prices include Built-in Voltage Control,
Magnetic Starters and all required operating accessories.

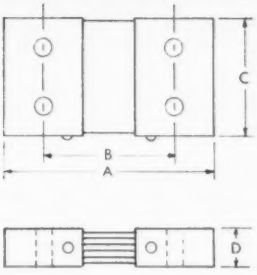
World's Largest Manufacturers of DUAL-O-MATIC PLATERS

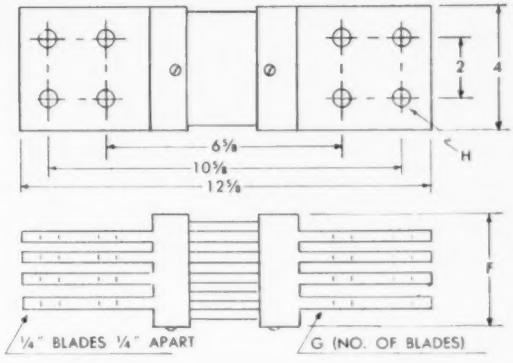
CLINTON SUPPLY CO.
RECTIFIER MANUFACTURING DIVISION
110-112 S. Clinton St. Chicago 6, Ill. Phone FRanklin 2-3538

You can fully rely on *Clinton Shunts*. Design and manufacture are based on over 47 years of application experience, and are job-proved • Each shunt is individually calibrated, and accurately rated • Quality construction of copper and manganin assures uniform current, properly controlled heat distribution, and infinitely long-life service • Large cross-section copper terminal blocks combine rigid mounting support with ample heat dissipation • Low temperature rise when properly installed in accordance with rated current • Available in standard types listed below, and in other size-ranges and special types.

Accurately Engineered

Performance Proved





100—2000 AMPERES 50 MILLIVOLTS

	MODEL S-100 SHUNTS					
	AMPERES	A	B	C	D	LIST PRICE
All dimensions in inches	100	4⅛	3 5/16	⅝	⅜	$6.85
	200	4⅛	3 5/16	1 3/16	½	7.85
	300	4⅛	3 5/16	1¼	½	8.85
	400	4⅝	3⅜	1	¾	10.90
Control the performance of your equipment through Clinton Shunts and Meters	500	5¾	3⅞	2	¾	11.95
	750	6½	4¾	2	1	17.50
	1000	5¾	3⅞	4	¾	22.40
	1500	6¾	4¾	4	1	32.75
	2000	6¾	4¾	4	1	35.60

2500—10,000 AMPERES 50 MILLIVOLTS

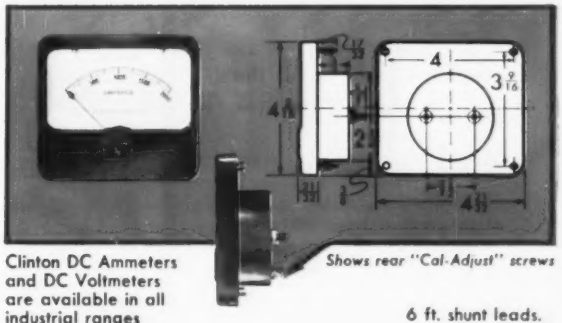
	MODEL L-200 SHUNTS				
	AMPERES	F	G	H	LIST PRICE
All dimensions in inches	2500	2	3	2 5/64	$55.85
	3000	2	3	2 5/64	65.10
	4000	3	4	2 5/64	98.75
	5000	3	5	2 5/64	119.40
	6000	4	6	2 5/64	132.60
	7000	4½	7	3 3/64	160.40
All list prices are subject to trade discount	8000	4½	8	3 3/64	195.50
	9000	5½	9	3 3/64	225.80
	10,000	5½	10	3 3/64	240.60

d'ARSONVAL MOVING-COIL METERS with exclusive Clinton rear screw "Cal-Adjust"

New built-in feature facilitates initial installation, saves you time and cost in re-calibration. Clinton meters give you the d'Arsonval moving-coil design for voltage and amperage measurement in direct current (DC) *plus* exclusive Clinton rear screw "Cal-Adjust".

Simply by turning two screws at the rear of the meter case, you can vary the meter setting by ± 2.5 millivolts to compensate for lead lengths, magnetic environment, any type or thickness of panel. This enables you to set the meter accurately against a standard. Once calibrated, Clinton meters maintain their tolerances for long periods. Meter accuracy: 2% full scale. Zero setting screw on front of meter case.

Quality construction includes precision-polished jewel bearings, accurately machined pivots, fatigue-tested springs, and stress-relieved assembly. Spade-type meter pointer and easy-to-read numerals are designed for clearer, faster reading.



Shows rear "Cal-Adjust" screws

Clinton DC Ammeters and DC Voltmeters are available in all industrial ranges
List Price, $12.50

6 ft. shunt leads.
List Price, $1.50

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RECTIFIER MANUFACTURING DIVISION
110-112 S. Clinton St. Chicago 6, Ill. Phone FRanklin 2-3538

World's Largest Manufacturers of
DUAL-O-MATIC® PLATERS

There's Plenty to SEE at Booth 50-C

Don't miss The Chemical Corporation exhibit at the Industrial Finishing Exposition. It's worth a special trip!

SEE AN ACTUAL DEMONSTRATION
of the LUSTER-ON® Color Process and the bright finishes produced.

SEE the simplicity of equipment, ease of control, lack of fuming or ventilation problems in dip applications without electric current.

SEE Luster-on® DECORATIVE COLOR,
clear bright, yellow iridescent and olive drab finishes for

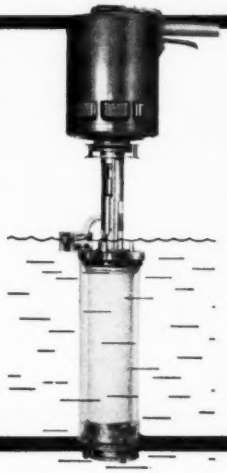
- eyecatching final finish
- protective finish for hidden parts and components
- paint bond for organic coatings.

On zinc, cadmium, copper, brass, aluminum.

SEE THE NEW WINSCOTT FILTER in action in a new reinforced plastic ***KEM/BAR*®** tank.

FOR consistent, faster, higher quality plating with low maintenance and operating costs.

WINSCOTT . . . keeps surface clean constantly
. . . prevents solution loss
. . . requires small space in tank
. . . corrosion resistant throughout



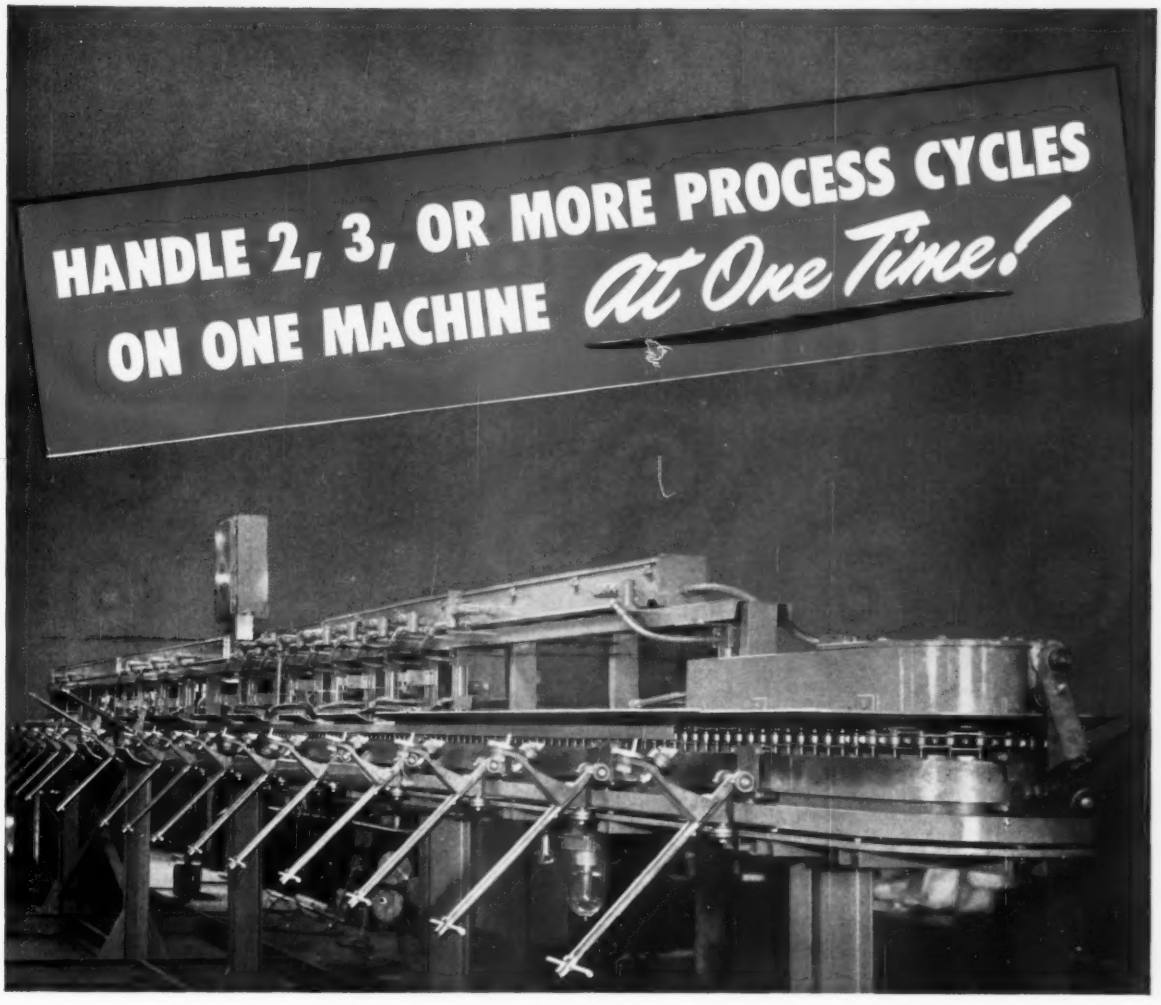
SEE STRIPODE the proved additive agent

- to strip nickel plate faster
- to protect base metal from pitting, roughening and etching
- to save on use of acid
- to eliminate need of sand blasting or heavy buffing.

SEE our Technical Service Personnel . . . in constant attendance during show hours to discuss your individual problems.

The Chemical Corporation

58 Waltham Avenue
Springfield, Massachusetts



LASALCO'S *Select-O-Matic*

MULTIPLE PROCESS PLATER

Another Lasalco development that offers the industry the last word in *fully automatic* plating!

With the new Select-O-Matic, the operator simply selects the desired process cycle for individual racks, when loading the machine, merely by turning a dial on the carrier. From that point, the rack *automatically* travels through the entire selected cycle without further attention.

A single Select-O-Matic plater, manned by one operator, will handle several various processes simultaneously. Different machines for each process are eliminated—original investment in equipment is greatly reduced—much less floor space is needed—maintenance is cut to an absolute minimum.

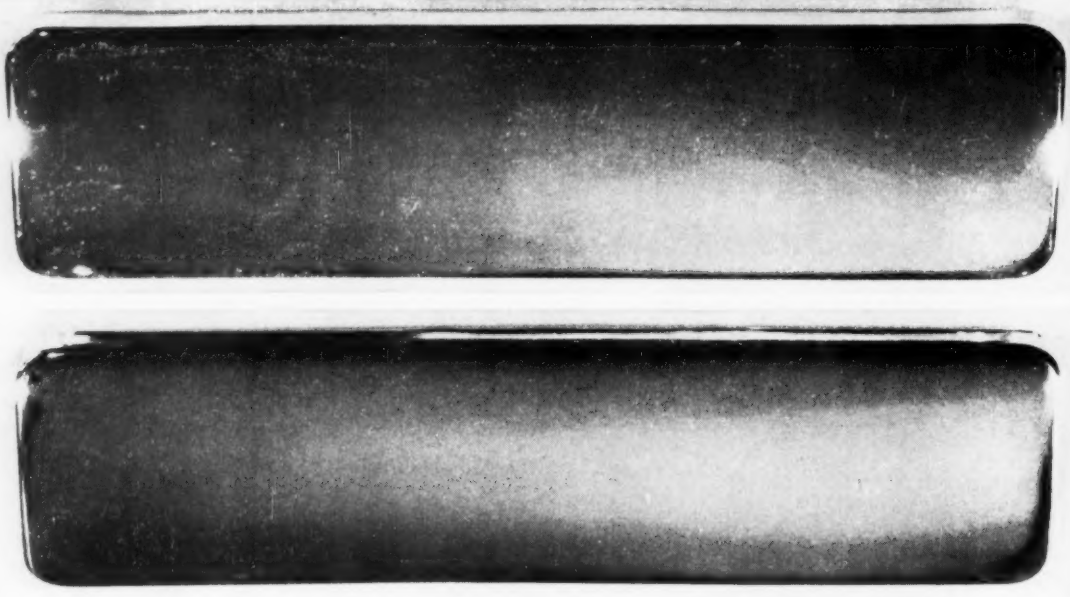
The Select-O-Matic is easily adaptable to any operation. Tell Lasalco about *your* operation and requirements to learn what this new machine can do for *your* production and profits.

See the Select-O-Matic in Action at the Convention — Booths 327A and 330A

LASALCO, INC.

HOME OFFICE: 2820 LaSalle St. • St. Louis 4, Mo. • PRospect 1-2990
IN TEXAS: 2805 Allen Street • Dallas, Texas • Riverside 7-5814

The Difference is *Soak Cleaning!*



These unretouched photos show plated zinc die-cast bars. *Top Photo:* Plating defects are visible on a bar precleaned with a conventional soak cleaner. *Bottom Photo:* Note the bright, lustrous, defect-free plate of the bar precleaned with Kelite SUPERSOLV as the soak cleaner.

For *bright, defect-free* die-cast plate . . .

Use Kelite SUPERSOLV as the Soak Cleaner prior to electrocleaning.

• What SUPERSOLV* is . . .

SUPERSOLV is a non-etch, non-passivating alkaline soak cleaner for zinc-base die-cast parts.

• What SUPERSOLV* does . . .

Used at a concentration of 5 oz./gal. at 160° to 170° F., SUPERSOLV removes mineral oils, buffing compositions and shop soils in a 1 to 2-minute soak cycle without sensitizing or staining the parts, or making them subject to roughness after electrocleaning and acid dip. The result is defect-free plate of improved brightness and lustre.

WRITE FOR PROCESS DETAILS ABOUT A TYPICAL ZINC-BASE DIE-CAST CLEANING CYCLE USING SUPERSOLV

*Patented, U. S. Patent Office

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KELITE CORPORATION

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Is yours one of them?

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your one-stop center for

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Today's consumer demands a finish that looks good and is durable.

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LEA MFG. COMPANY OF ENGLAND, LTD
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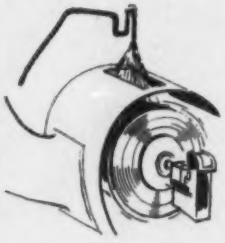
Complete testing and manufacturing facilities to help YOU solve your production line problems in BUFFING · POLISHING · BURRING LAPPING · SATIN FINISHING



LEA COMPOUND . . . industry's pioneering greaseless composition for burring, buffing, satin finishing, and flexible polishing; contains abrasives ranging from sharp, fast-cutting grits to fine, soft powders for delicate finishes.

LEA LIQUABRADE . . . clean-working, fast-cutting and mirror-finishing liquid buffing compound, providing in effect continuous operations and substantial economies in compositions and buffs; clean and safe, non-flammable, non-explosive; many abrasive types and grain sizes for all non-ferrous metals, steel, stainless alloys, and plastics.

LEAROK . . . compositions with "no free grease" designed primarily for buffing or coloring pieces which involve cleaning difficulties; does not pack up in recesses and ornamentations.

LEA GRIPMASTER . . . high bonding strength cement for polishing wheels and belts; used in setting up longer lasting polishing wheels and belts for both ferrous and non-ferrous metals.

AD-LEA-SIVE . . . glue-base adhesive for sizing, buffing and polishing wheels prior to application of Lea Compound, Leabrasive or other loose abrasives; available in bar form or bulk.

LEA LAPPING PASTE . . . micron size controlled abrasive paste for accurate and fine surface finishing.

LEA ANALYTICAL METHODS . . . plater's short cut methods for analyzing plating solutions.

LEA LIQUALUBE . . . water soluble liquid lubricant for polishing wheels and belts; can be sprayed or brushed on.

LEA LUBAR . . . bar form lubricant for polishing wheels and belts where glazing is not a problem.

cLEAn GRAIN LUBAR . . . special bar form lubricant to eliminate glazing on polishing wheels and belts.

LEA COLDSTRIP . . . a room temperature, non-toxic stripper for synthetic enamels; requires minimum ventilation; can be filtered for continuous use.

LEA SYNSTRIP . . . a fast working, non-corroding liquid stripper for enamel, lacquer and synthetic coatings; will not attack base metal or alloy; does not dissolve the coating but breaks the bond. Heating permits alkyd, epoxy, phenolic silicone and urea coatings to be stripped in seconds.

LEATARDENT . . . anti-stain dip emulsion; prevents staining and tarnishing of plated surfaces.

LEA PLASTI-BRADE . . . a flexible liquid abrasive polishing composition carrying the finer grit sizes.

LEA PLASTI-GLUE . . . a flexible liquid adhesive for setting up polishing wheels.

LEA KROMSAVERS . . . inert plastic rods and floating tubes . . . mist preventive for chrome and other plating solutions.

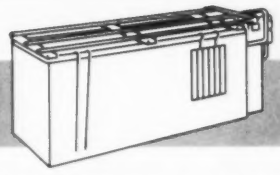
LEA LECTROMAG . . . portable electrical instrument for measuring the thickness of non-magnetic coatings on carbon steel and iron.

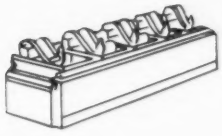
LEABRAMENT . . . greaseless, non-flammable, quick-drying, liquid abrasive for burring and polishing; can be sprayed or brushed on wheels.

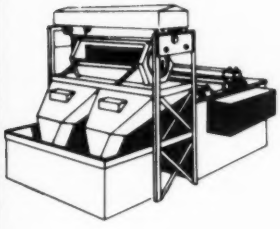
LEA COPPER-GLO . . . . . tolerant to contaminants while consistently producing a high speed, buffable, bright plate.

LEA BUFF RAKE AND EVENER . . . a sturdy "two handy tools in one" for raking and evening of buff wheels without tearing the buff face, breaking threads or leaving jagged, rough or uneven surfaces.

Tested BRIGHT PLATING PROCESSES, ADDITIVES and SPECIALTIES developed by electrochemists to exacting standards. Product and Process hand in hand from one source of supply.







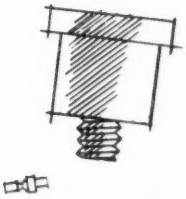
LEA-RONAL CYANIDE COPPER PROCESSES

...COPPER-GLO produces brilliant copper deposits; exceptionally tolerant to impurities.

CUPRALL produces high speed buffable copper where brilliance is not required.

Q-STRIKE designed for operation with Q-Level; produces superior foundation; advantageous as an undercoat for all cyanide copper baths and nickel plating; increases lustre and hiding characteristics of subsequent copper or nickel.

Q-LEVEL produces lustrous copper deposits having excellent "hiding" characteristics.



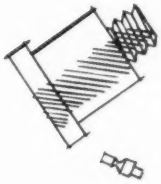
LEA-RONAL ACID COPPER PROCESSES

...COPPER GLEAM bright ductile deposits with exceptional leveling characteristics.

CUPROTYPE smooth, ductile, tree-free, heavy deposits at high speed. Adaptable for electroforming, electrotyping, printed circuitry, etc.

LEA-RONAL HIGH SPEED BRASS... BRASS-GLO

uniform lustrous deposits over a wide current density range. High speed deposition with ease of color control.



LEA-RONAL BRIGHT NICKEL... NICKEL GLEAM N-222

ductile deposits, with exceptional leveling characteristics, high throwing and covering power.

NICKEL GLEAM N-1 a bright all-purpose type bath with exceptional tolerance to impurities. A true "work horse" nickel bath.

NICKEL-GLO a "no sludge" addition agent for barrel nickel, producing bright deposits with simplicity of operation.

MIRRO-GLO similar to Nickel-Glo in effect but for still tank nickel plating.

LEA-RONAL BRIGHT GOLD... AURO GLO

bright low pH gold processes for producing brilliant deposits. Can produce 24K or Hamilton shades. Exceptionally stable solution, simple to operate, excellent metal distribution and solderability. Hardness can range from 200-400 Knoop.

MS PROCESS a bright cyanide gold utilizing low metal concentrations.

LEA-RONAL BRIGHT SILVER... SILVER-GLO

produces bright, hard tarnish-resistant deposits at high rates of speed from crystal clear solution. For industrial or decorative uses.

LEA-RONAL BRIGHT ZINC... a bright zinc

for barrel and still operation. Stable brighteners have long staying power.

LEA-RONAL BRIGHT CADMIUM ... a bright

protective cadmium electrodeposit for use on both ferrous and non-ferrous metals.

SUPERTARTRAL... exceptionally effective addition agent for cyanide copper baths; aids anode corrosion, reduces cyanide breakdown.

WATERSHED... liquid rinse aid which promotes free rinsing and fast drying, hence reduces staining and spotting of plated pieces.

WETTING AGENT CW-7... addition agent

for all cyanide copper plating baths, particularly Lea-Ronal. Benefits anode corrosion; increases tolerance to organic contamination.

RONAL EZ KLEEN FILTER... a different type

filter operating on a vacuum principle. Crystal clear filtrate, flexible fast cleaning, simple to operate, economical.

See next page

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The JET series was developed to fill the need for economical, efficient, low-foaming spray cleaners to be used on zinc, copper, brass or steel.

- JET CLEANERS step-up the efficiency of your spray cleaning equipment, even at low temperature.
- Reduce overflow loss with new-foaming formula (no silicones or troublesome chemicals), permitting wider range of concentration.
- Carry heavier dirt load without redeposition.
- Remove all types of soil.
- Are harmless to rack coatings and equipment.
- Non-toxic, dust-free, non-caking.
- Offer better results at lower cost.
- Are effective Rust Inhibitors.

Remember — YOUR COST PER FINISHED ARTICLE IS THE TRUE COST OF YOUR CLEANER

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—a new systems concept for the finishing of metals.

Process Engineering Service

The first—and only—service built around the most important part of your operations . . . your process requirements.

Why a PROCESS Engineering Service?

Allied Research's long and broad experience in helping customers solve process and equipment problems of all types has led to one important conclusion:

Only by integrating equipment with your particular process are you assured of getting these important benefits from your operations: (1) higher production, (2) greater efficiency, (3) lower operating costs, (4) consistent product quality.

Our success in helping our many customers reach these important objectives has prompted us to offer this unique service to the entire metal finishing industry.

What does our Process Engineering Service consist of?

CONSULTATION—Experienced representatives will assist you in properly planning any part of or all your process and equipment requirements.

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SERVICE—Field Engineers insure proper start-up and will make necessary maintenance recommendations. They are available for periodic check-up.

"TURN-KEY" Service—let Allied Research take complete responsibility for laying-out, designing, building, installing and servicing your complete process operations. *Open the door to your plant and start production.*

Get the complete details on Process Engineering Service today. Call your Allied Field Engineer. He's listed under "Plating Supplies and Equipment" in the yellow pages. FREE TECHNICAL DATA FILES on Allied Research processes, equipment and chemicals sent on request.

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for mirror-bright gold and rhodium plating

ATOMEX® is a 24k gold immersion solution that permits the deposition of a thin, dense, uniform layer of 24k gold on printed circuits, trophies, costume jewelry, lamp components, clock assemblies, photograph frames, bottle caps, radio knobs, metallized plastics and many other objects, by means of a simple bath. The Atomex procedure is more permanent and less expensive than electroplating of comparable thickness. Costly analytical control is unnecessary.

RHODIUM Plating Solution . . . is ideal for putting a decorative finish on many types of jewelry, and for electrical and electronic applications. It has a hard, brilliant white, non-tarnishable, highly reflective surface and is extremely resistant to corrosion. It gives greater sales appeal to any jewelry on which it is used. A complete line of Rhodium plating solutions are available.

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a simplified mirror-bright silver plating process

Here is the most efficient, simple procedure to produce mirror-bright silver plate, finished directly—through a complete range from flash to heavy deposit. It is being used with outstanding success for all types of jewelry and hollow ware. The procedure is easy, economical and non-critical—with little or no polishing required. Silva-Brite is a clear, water-white solution, enabling the operator to observe work as it is being plated. Uniformly good results are attained with current densities ranging from 10 to 40 amperes per square foot. Normal room temperature operation minimizes fumes and tendency toward bath decomposition. Send for descriptive data together with detailed plating procedures.

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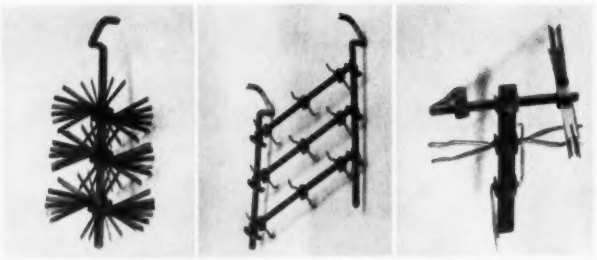
"Stand-It-All" Rack Patch does the complete patching job on your insulated plating racks. One or two coats are ample and it is air dry.
SQUEEZE ME
It's a must for patching after making a tip replacement . .
Injured Areas Are Mended to Perfection With Just a Squeeze of the Tube . . .



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WITH
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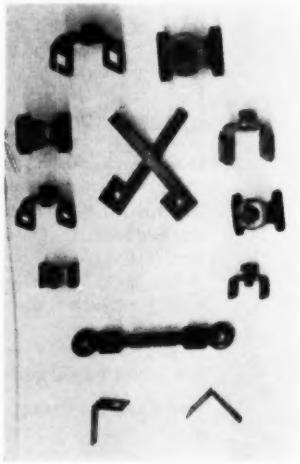
FOR PLATING, ANODIZING, PAINTING

"PUT THEM ALL TOGETHER, THEY SPELL PROFIT"

A wrench is all you need to quickly assemble racks for almost any job. You cut rack preparation time to a fraction, need no bulky equipment. There's no bending, no forming, no holes to drill, no mistakes that can't be rectified in seconds. There IS convenience, ease of operation and, above all, more margin for profit when you use ERECT-A-RACK!



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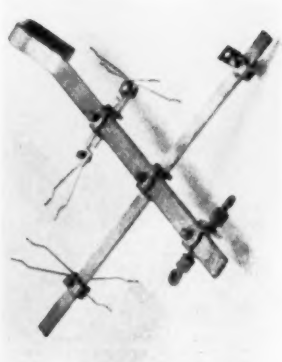
ERECT - A - RACK
COMPONENT PARTS

SEND FOR OUR NEW CATALOG



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Now . . . an extra plus that keeps anodes clean!

For years McGean Cast Carbonized Nickel Anodes 99% plus have been first choice of many discriminating users. Consistent, dependable high purity, coupled with our manufacturing "know how", has given consumers freedom from worry when Besplates were employed in their Nickel Plating operations.

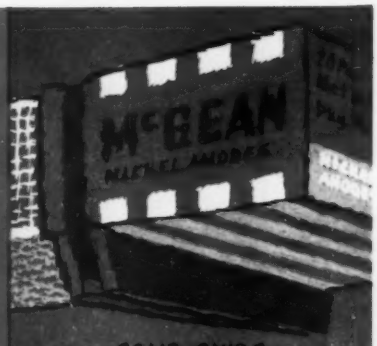
Good as they were, we continued to seek possible improvements and through research we are now pleased to announce two important developments.

1. Besplates are now electrolytically treated just prior to shipment in a novel manner providing a chemically clean silvery surface to each and every anode. No longer will there be any need for platers to clean anodes after arrival to avoid introduction of oils, greases or dirt into plating solutions.

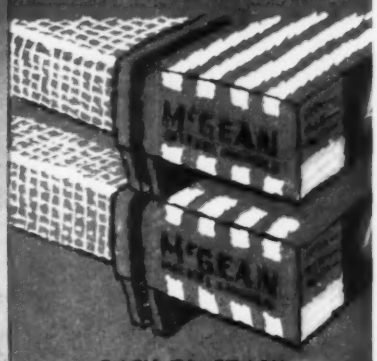
2. A valuable product deserves an attractive package. McGean now supplies Besplate Nickel Anodes in a handsome container, so designed to deliver in perfect condition those chemically clean anodes produced in our new process. The container is strong, contents well marked, capable of easy stacking for storage and a real space saver. Your Plating Department is sure to approve of the neat, clean manner in which McGean Besplate Nickel Anodes reach your plant.

USE . . .
McGEAN Besplate
Nickel Anodes

All other types of McGean Nickel Anodes are now in the new packaging unit. This includes recast anodes made from your Scrap. We are skilled in the art of refining and casting Scrap Nickel.



SOLID SKIDS



EASY TO STACK

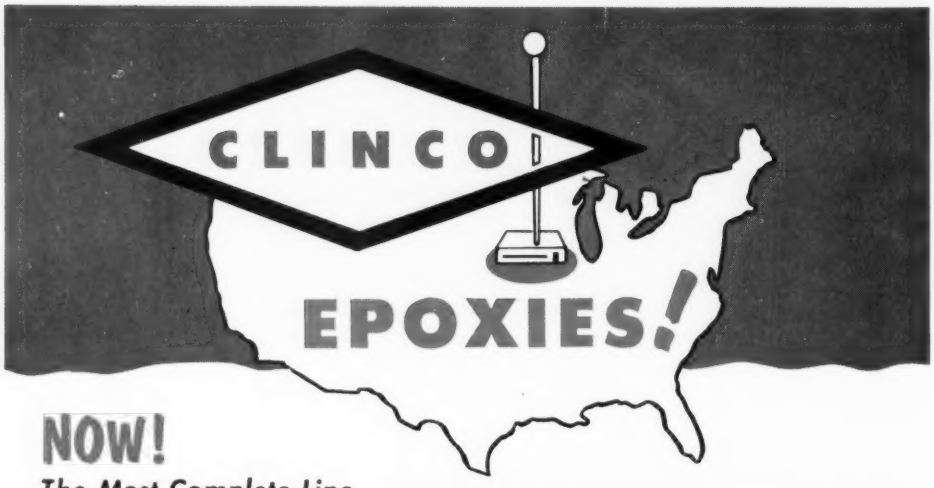
X-TRA STRONG WRAPPING

EASY TO INVENTORY

McGEAN

THE McGEAN CHEMICAL COMPANY

CLEVELAND DETROIT



NOW!

The Most Complete Line of Quality

COLOR PASTES

for EPOXY RESIN Compounds

from a long established, reliable, centrally located Chicago manufacturer

Code No.	Name
2-M-302	Plastic White
2-M-303	Permanent Black
2-M-304	Primrose Yellow
2-M-305	Orange
2-M-306	Glass Green
2-M-307	Blue
2-M-310	Mercadium Red

The vehicle portion of all the Epoxy Dispersions employs the finest quality (100% solids) liquid Epoxy Resin on the market today. All colorants used have excellent resistance to color change due to the effects of light and heat.

Special shades of color dispersions can be manufactured for quantity users. Every user of Epoxy Componds or Resins should carry a line of CLINCO Epoxy Dispersions. This will enable you to transform any color of Opaque Epoxy Compound which you are now using into a variety of bright colors.

The Most Complete Line of Tailor-Made

EPOXY COMPOUNDS

Your Inquiries Invited. Write or Phone for Complete Details.

Customer Service is Our No. 1 Concern

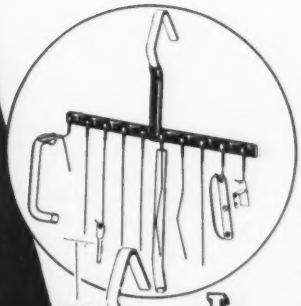
THE CLINTON COMPANY

PIONEERING QUALITY INDUSTRIAL FINISHES SINCE 1928

1220 ELSTON AVE. • CHICAGO 22, ILL.

Phone: ARmitage 6-7760

New, Ready Made Mass-produced *Economy* Plating Racks

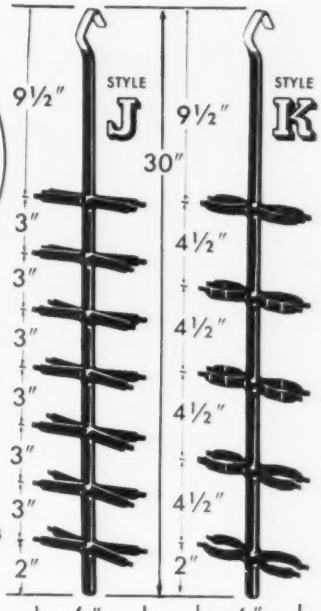


STYLE **L**

7 3/8

$4.50

Straight .093 dia. phosphor bronze wires; 8" long, 1½" centers. Wires easily shaped or shortened.



Tips 1/16x1/2" $6.50

Tips 1/16x1/2" $5.75

36" lengths available

STYLE **M**

Insulated "S" Hooks

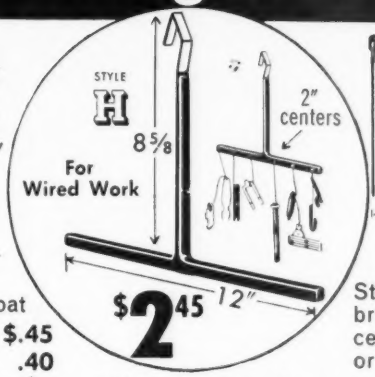
9"

¼" copper rod heavy plastisol coat

Less than 100, $.45

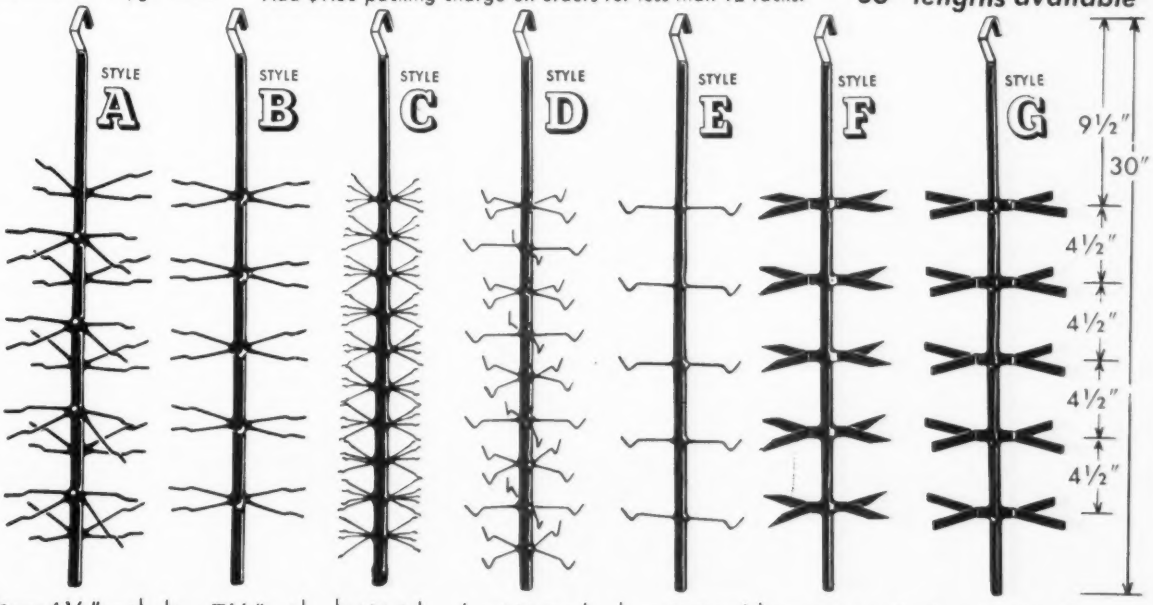
100 or more, .40

available in ⅛" rod.



$2.45

Add $1.50 packing charge on orders for less than 12 racks.



6½" Tips .114" dia. $5.78

7½" Tips .114" dia. $4.77

4½" Tips 1/16" dia. $6.00

6½" Tips 3/32" dia. $5.83

6½" Tips 3/32" dia. $4.42

7½" Tips 1/16x1/2" $5.84

7½" Tips 1/16x1/2" $5.69

Spines one-piece solid copper round cornered and sand blasted. Tips phosphor bronze, riveted to spine and soldered when necessary for complete rigidity. Coated after assembly with BELKE Universal Plastic.

Belke MANUFACTURING COMPANY

947 Cicero Ave., Chicago 51, Ill

EVERYTHING FOR PLATING PLANTS

TRADE MARK

WILLIAMSVILLE Buffs

WILLIAMSVILLE BUFF DIVISION
EST 1893 A1 ®
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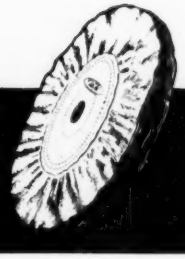
DANIELSON CONNECTICUT

- Cool running
- Cutmaster
- Bias Sisal
- Flexmaster

Consult us now about your needs!



WILLIAMSVILLE BUFF DIVISION
The Bullard Clark Company
DANIELSON, CONNECTICUT

DOW | SARAN LINED PIPE

Eight years and 400,000,000 acid gallons later...

not one replacement due to corrosion in Saran Lined Pipe

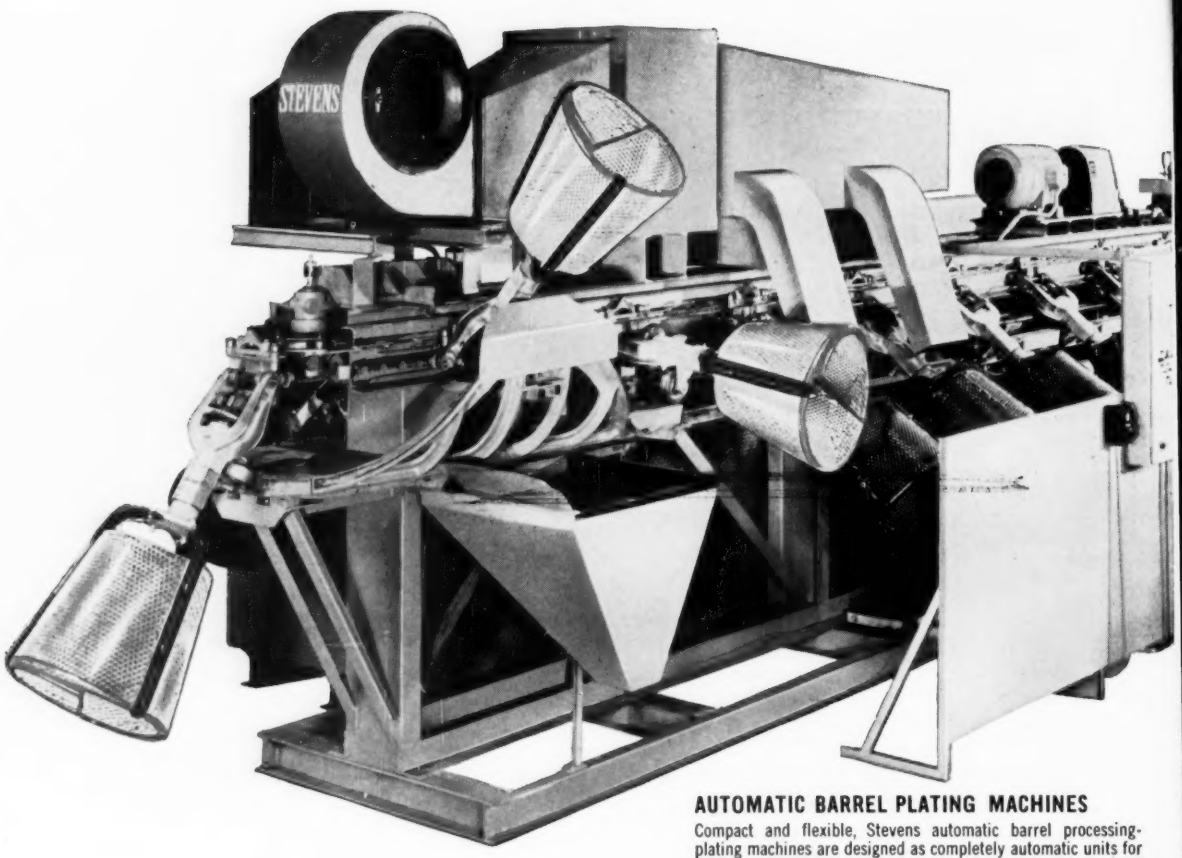
A million gallons a week of 100°F. acid rinse loaded with metal precipitates . . . half a mile of pipeline to carry it . . . a perfect combination to tempt corrosion. Thanks to Saran Lined Pipe and valves, there's *never* been a shutdown to replace corroded pipe.

General Electric Company's Erie Plant, Erie, Pennsylvania, has used this line constantly since 1951. Part of the line passes through buildings, taking severe punishment from vibration set up by heavy machinery. Most of the half-mile line is outside, expanding or contracting when temperatures change. Even under these adverse conditions, this Saran Lined Pipe System has shown no signs of mechanical failure.

When your plans include piping systems that must resist corrosion and chemical activity, and that can be easily fabricated or modified in the field . . . call for Saran Lined Pipe.

Saran Lined Pipe, fittings, valves and pumps are available for systems operating from vacuum to 300 psi, and from below zero to 200°F. For more information write Saran Lined Pipe Company, 2415 Burdette Ave., Ferndale, Michigan, Dept. 2500CF6.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN



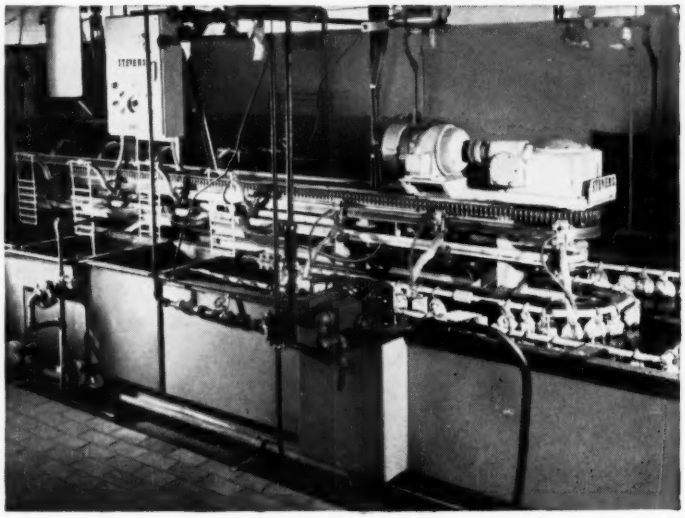
AUTOMATIC BARREL PLATING MACHINES

Compact and flexible, Stevens automatic barrel processing-plating machines are designed as completely automatic units for integrated manufacture. They provide for the most economical and rapid plating of small parts.

STEVENS...TIME-TESTED SOURCE

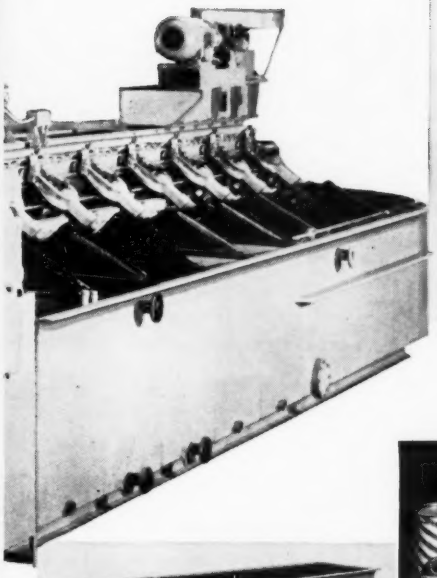
For more than fifty years, Frederic B. Stevens Inc. has been a leader in the development and sale of prefinishing and plating equipment and supplies. If you have parts to buff, polish, clean and plate, this experience is yours for the asking –and naturally the equipment to do this work incorporates the latest techniques for high production and lower costs.

This Stevens catalog in miniature is an example of our wide range of equipment and supplies. Pick out what you need – then get in touch with your local Stevens representative. He'll tell you what you want to know–specifications, prices, delivery dates, everything.



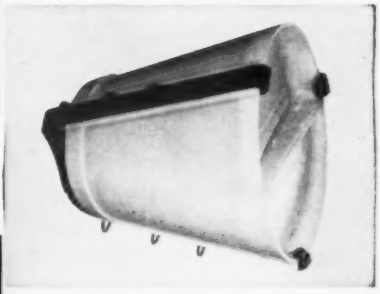
LITTLE STEVE PLATING MACHINES

Almost every electroplater likes the "Little Steve." It's tops for such applications as electroplating, anodizing, enameling bright dipping and phosphating. "Little Steve" can fit into almost any existing factory layout.



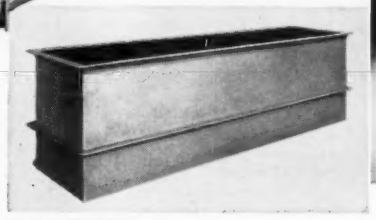
ROTO-FINISH VIBRATRON

New and revolutionary method for fast mechanical finishing. Entire abrasive mass is agitated so that media are used more efficiently. Equipment proved. Minimum wear. See your Stevens representative for details.



POLY-CARB BARRELS

New, lighter, stronger, longer lasting oblique barrel cylinders are now introduced by Stevens. Withstand temperatures upwards of 250°. Stevens also furnishes barrels in Plex-i-glas, Tempron and Plastisol-covered steel.



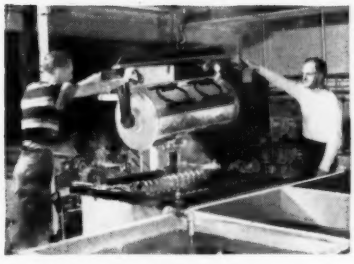
STILL TANKS

Stevens can supply you with still tanks built of steel, stainless steel, aluminum, also Koroseal lined, rubber lined, lead lined. Stevens will design special purpose tanks for specific needs.

BUFFING-POLISHING COMPOSITIONS

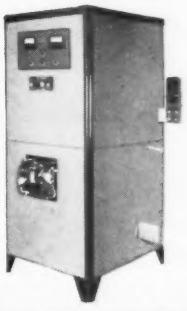
Stevens can furnish either liquid or bar compositions for every use from coloring thin gold flash to buffing nickel-plated bumpers. Ask for the Stevens L. V. compositions catalog.

FOR FINISHING and PLATING NEEDS



HORIZONTAL BARRELS

Where the situation is appropriate for horizontal barrel lines, Stevens will engineer and supply such systems for you. Cylinders are furnished in Tempron or Plex-i-glas.



SILICON OR SELENIUM RECTIFIERS

Highly efficient Stevens rectifiers are built for tough use over long periods of time. A large selection of standard models is available. Special models built on order.

PLATING AND FINISHING SUPPLIES

Chemicals and supplies for all plating and finishing operations. Anodes, cleaners, filters, buffs, compositions and Hydra-Blast supplies and equipment. Prompt delivery of whatever quantity you need is assured from your nearest Stevens branch.

frederic b. **STEVENS,** inc.

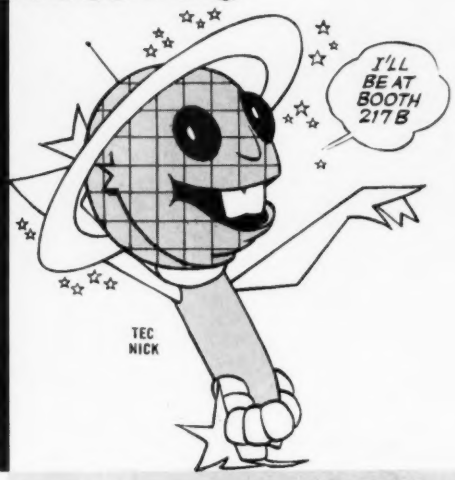
DETROIT 16, MICH.

BUFFALO CHICAGO DETROIT CLEVELAND
DAYTON NEW HAVEN INDIANAPOLIS SPRINGFIELD (OHIO)

Electroaurotechnics

A big word, but to us at Technic an important one, for our more than 50 years combined experience in the field of Precious Metal Plating Metallurgy is continually being used to improve and develop new soluble golds, and application procedures for the electro deposition of gold and gold alloys to meet the ever changing technological requirements of today and tomorrow.

We are justly proud of our reputation for solving tough problems, and for the millions of dollars saved by the adoption of our Electroaurotechnics and superior soluble golds, among which are:



Technic INDUSTRIAL 24 Kt GOLD → (aqueous) the world's purest soluble gold, specified and used by many leaders in the Missile, Atomic and Electronic fields.

Technic OROSENE 999 Patent Pending **24 Kt Acid Bright Gold** → The first NEW development in gold electroplating in over 100 years. It produces electroplates both hard and ductile using ONLY ONE addition agent operating at room temperature under POSITIVE and simple control.

Technic H.G. BRIGHT 23+ Kt GOLD → The only bright gold operating with less than 1/10 ounce free cyanide per gallon at room temperature, offering variable hardness to fit your specifications . . . at a non-premium price.

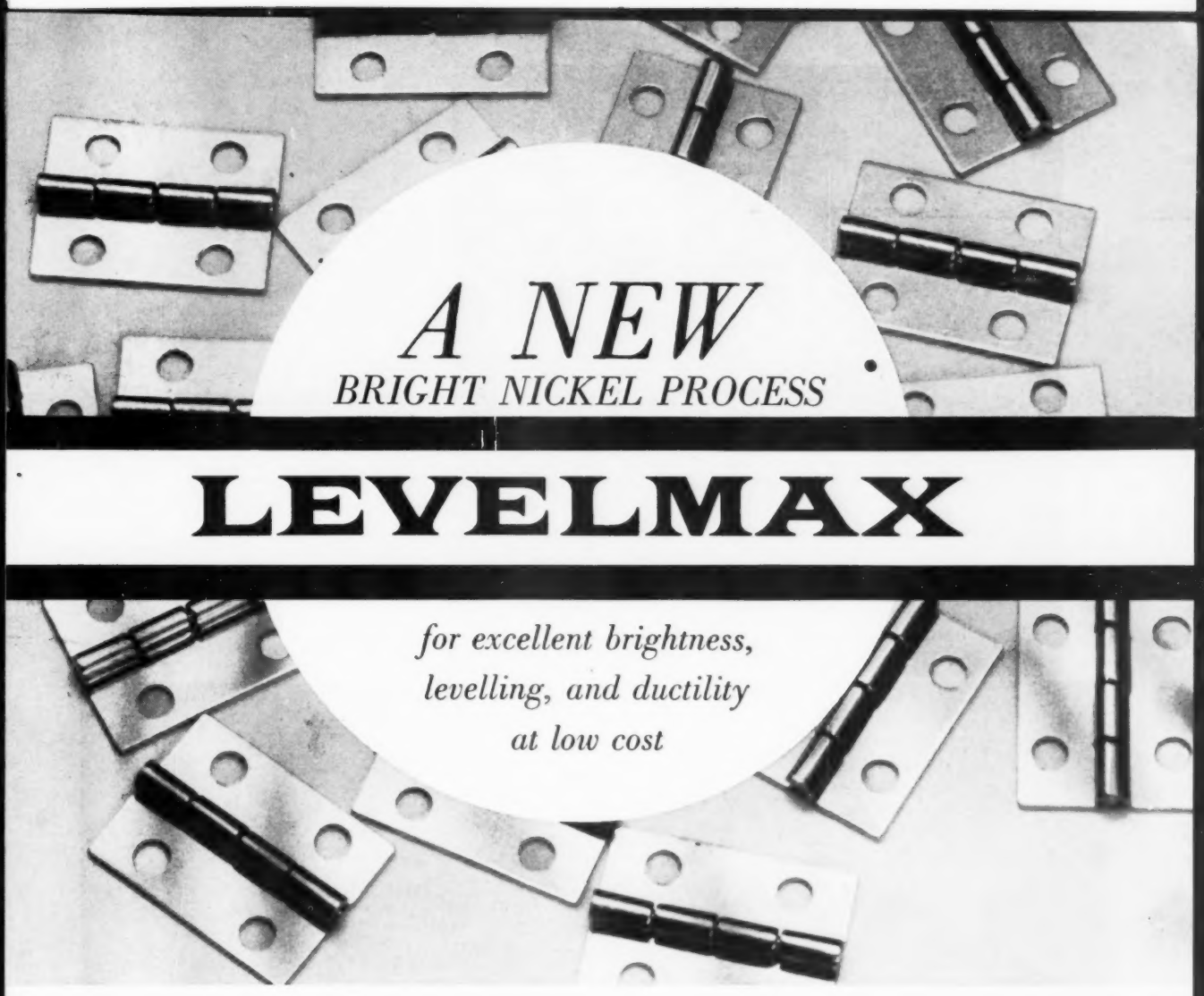
We would also like to call your attention to **Technic's RHODIUM SULPHATE T.P.** → A superior rhodium concentrate of high purity offering low stress deposits and tight grain structure.

Full information on these superior soluble metals is available upon request . . . also the complete resources of our laboratories, and the most experienced Precious Metal Plating metallurgists in the world are at your service, without obligation. Phone, TWX, wire or write.

PRODUCTS OF RESEARCH

Technic Inc.

PROVIDENCE 1 R. I.
39 Snow St. JAckson 1-4200
Chicago Office: 7001 North Clark St.



A NEW
BRIGHT NICKEL PROCESS

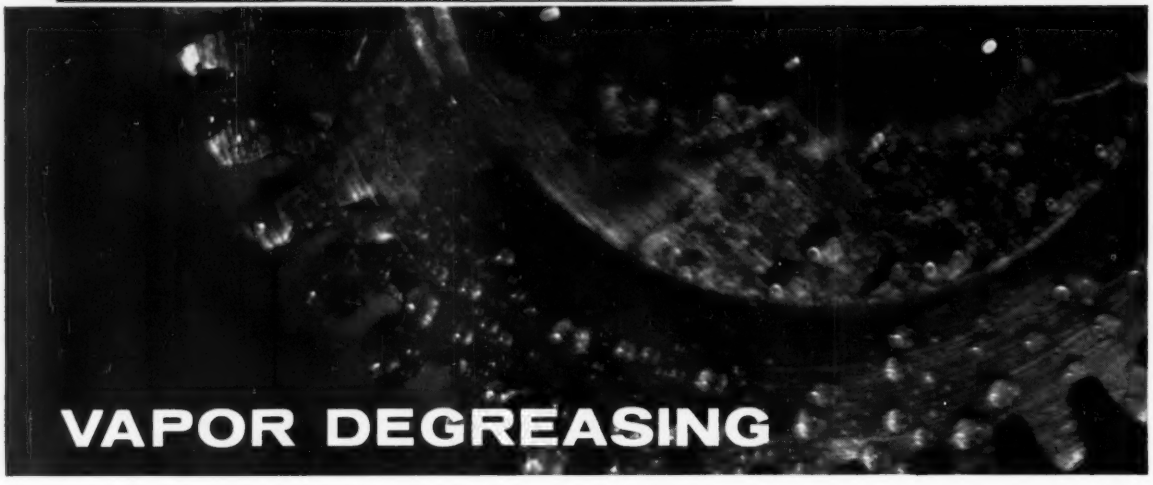
LEVELMAX

for excellent brightness,
levelling, and ductility
at low cost

Now—for the widening use of nickel plating and the new plating problems brought about by the wider variety of shapes and base metals—ASARCO has developed a new process, simple to control and maintain. LEVELMAX will tolerate considerable organic and metallic contamination even with infrequent purification or treatment. Buffing and finishing of the base metal can often be completely eliminated. Hard-to-buff areas can be plated bright. The bright-nickel surface readily accepts chrome. Corrosion resistance is excellent. Maximum productivity is assured by high current densities which are successfully used with the LEVELMAX process. Conventional or air agitation can be used. Analytical procedures are provided for the determination of all constituents. Write for complete working details about the new LEVELMAX BRIGHT NICKEL PROCESS to Federated Metals Division of American Smelting and Refining Company, Electrochemicals Dept., 120 Broadway, New York 5, N. Y. In Canada, Federated Metals Canada, Ltd., Toronto and Montreal.

FEDERATED METALS DIVISION

ASARCO



Now, one grade of trichlor does both

Whether you clean a rocket or degrease a gear, you can now use Nialk® metal degreasing grade trichlorethylene as your cleaning agent.

This grade of Nialk meets rigid government and industry standards for solvents used to clean rocket and missile components. It leaves little or no residue when it evaporates. At the same time, it keeps the above-average chemical stability needed for vapor degreasing.

The savings in this twofold use of one grade of trichlor can be readily seen. Now you can:

Cut your inventory and make your buying easier.

Avoid errors. No one can pick the wrong drum when you're buying just one grade of trichlor.

Make your materials handling easier.

Help end your disposal problems. Usually you can use the Nialk trichlor from your flushing operation in your vapor degreasing operation without distilling, or the solvent can be recovered and used again and again.

STABILITY WITH psp

You get **psp** too, when you ask for Nialk trichlorethylene. **psp** is "**p**ermanent **s**taying **p**ower," the ability of the stabilizer to keep from wearing out.

You can get more information on this metal degreasing grade of Nialk trichlor. Just write for specifications and data.

HOOKER CHEMICAL CORPORATION
1306 UNION STREET
NIAGARA FALLS, N. Y.

HOOKER CHEMICALS PLASTICS

Sales Offices: Chicago, Detroit, Los Angeles, New York, Niagara Falls, Philadelphia, Tacoma, Worcester, Mass.

In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

Sanding time cut 38% with LOWE VINOC

Another example of the kind of cost-saving ideas you can get from an experienced Lowe Brothers finishing engineer. Here's the story:

"I suggested Lowe Vinoc when the plant superintendent complained about the sanding time required with another product. Now they save 38% in sanding man-hours by spray finishing with Vinoc, and they're well pleased with its appearance. The 38% is their figure."

Let a Lowe Brothers finishing engineer help *you* find ways to reduce costs. He knows finishes *and* methods — and he'll gladly make a "flow-chart" analysis of your finishing system if you'll send the coupon. No obligation, of course.

LOWE BROTHERS
INDUSTRIAL FINISHES
QUALITY UNSURPASSED SINCE 1870

Style-tested paints for Home and Industry

REPRESENTATIVES IN: Chicago, Ill. • Boston, Mass. • Jersey City, N. J. • Cleveland, Ohio • Pittsburgh, Pa. • Rochester, N. Y. • Dayton, Ohio • Columbus, Ohio • Milwaukee, Wis. • Indianapolis, Ind. • Cincinnati, Ohio • Detroit, Mich. • Springfield, Mass. • Philadelphia, Pa.

The Lowe Brothers Company MF-6
Dayton 2, Ohio

☐ Please have my nearest Lowe Brothers Finishing Engineer call on me as soon as possible.

NAME_____

TITLE_____

FIRM NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Analysis . . pH, and Thickness Testing

MADE SIMPLE WITH

KOCOUR TEST SETS

Nothing can surpass the economy and convenience of regular control. It helps prevent trouble. When you do have a problem, you can determine the cause quickly . . . especially, if you're equipped with control for analysis and pH for your various baths and thickness testing for your plated work.

Control Your Solutions with KOCOUR TEST SETS

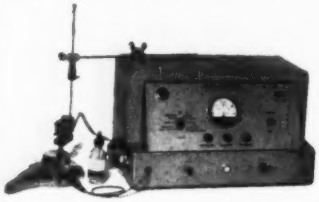
Kocour Test Sets provide the simplest, most direct analysis. Easy to use . . . no knowledge of chemistry required. Complete with glassware, reagents and directions.

. . . . For every plating purpose

Kocour Test Sets are available individually or in economical combinations for the control of plating, cleaning, pickling, anodizing, sealing, coating, passivating, desmutting, deburring, phosphorizing, heat treating, pH control and thickness testing. Write for your FREE copy of "Lab Hints for the Plater."

PLATING THICKNESS TESTING

Try a Model 955 on a 15-Day FREE Trial!



- direct reading
- virtually automatic
- 90-95% accurate
- simple operation

Model 955 determines the thickness of heavy or decorative chromium, silver, tin, cadmium, zinc, brass, copper, nickel, lead and other alloy deposits, on various basis metals (including Copper-Nickel-Chromium Composite Coatings). Write for Bulletin 400 and ask for details on a 15-Day FREE Trial!

● KOCOUR testing sets are used all over the world for controlling plating — cleaning — pickling — anodizing — and hardening processes . . . special sets can be provided for your requirements.
Write today for complete information — no cost or obligation.

KOCOUR COMPANY
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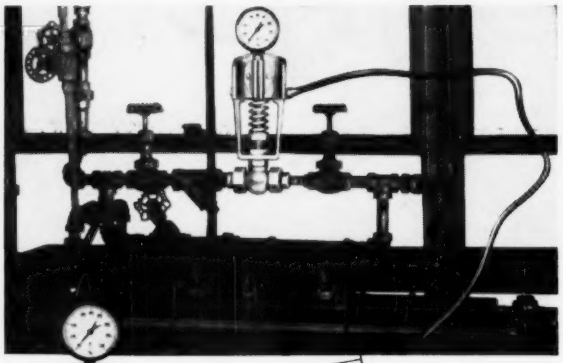
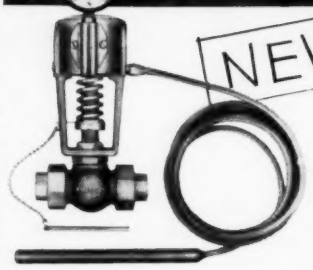
CHICAGO 32, ILLINOIS

Specify KOCOUR test sets from your supplier.

~ See us in Booths 67-68 at the I. F. E. in Detroit ~

Cut your Plating Costs





AMERICAN TEMPERATURE REGULATORS

Save 8 Ways

Hold your plating tank temperatures within closest possible limits. Use fast-acting, self-operated American Temperature Regulators and get these advantages:

1. Accurate temperature control
2. Lower first cost
3. Save on installation
4. Reduce maintenance
5. Reduce rejects and costly reworking
6. Prevent breakdown of the solution
7. Stop overheating and boil off
8. Peak performance from high-production conveyorized equipment

Low-cost American Temperature Regulators have standardized parts and unitized assembly. Installation costs less. No compressed air or electricity needed. Maintenance is practically nil. Temperature adjustment and repeat setting take but a few seconds. Dial thermometer accurately indicates the tank temperature; can be faced for easiest reading.

You profit more from continuously uniform, high-quality plating. Invest in money-saving American Temperature Regulators. *Sizes:* ½" to 1½". *Temperature Range:* 110/220°F. standard. *Temperature System:* Bulb and line enveloped in plastic for longer service life. Bellows is Neoprene-protected against corrosion. *Valve:* Bronze body with stainless steel seat and disc. *Ask for Bulletin 115.*

Phone your industrial supply distributor for counsel, service, and prompt delivery from his local stocks.

MAXWELL MANNING MOORE MM TRADE MARK

AMERICAN TEMPERATURE REGULATORS

A product of

MANNING, MAXWELL & MOORE, INC.

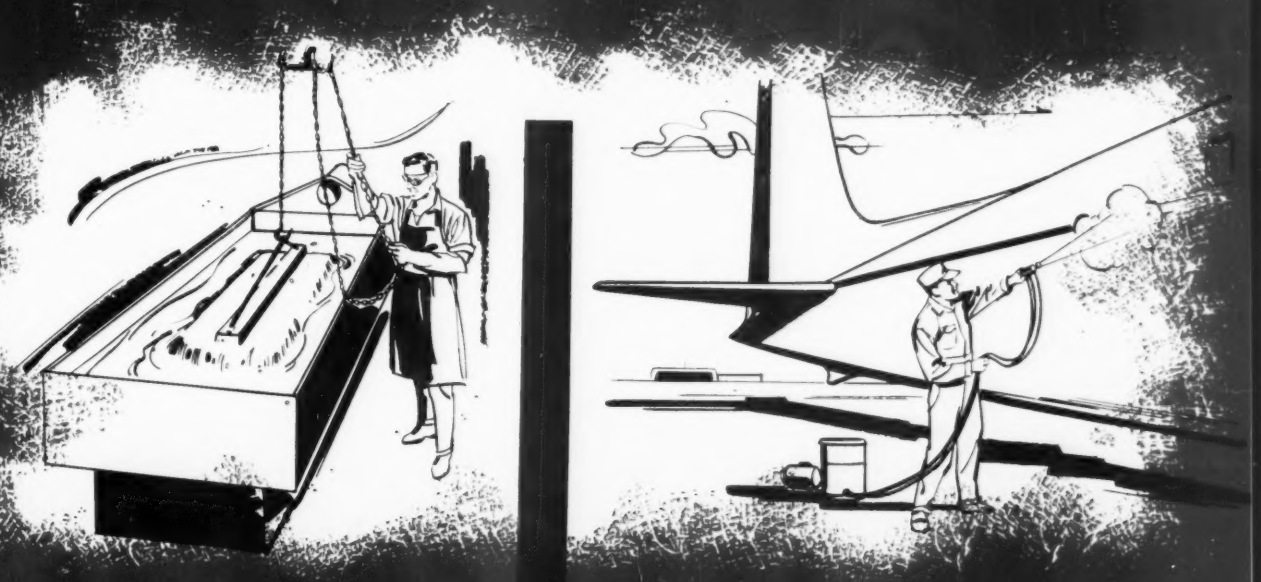
Consolidated Ashcroft Hancock Division • Stratford, Connecticut
In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

NEW from DIVERSEY

a complete selection of

PAINT STRIPPERS

for all organic finishes including epoxies



For complete selection guide please turn page . . .

SELECTION GUIDE

HOT...COLD...SPRAY...DIP
CAUSTIC...SOLVENT...CRESOL

whatever your stripper requirements... DIVERSEY has the answer

Modern industrial practice presents many opportunities for substantial savings through the use of the *right* paint stripper. Repainting of rejects that did not meet finishing standards; removal of over-spray from paint racks and other equipment; removal of old finishes to modernize or renovate old capital equipment . . . these are typical of the hundreds of industrial applications requiring a safe, fast and economical paint stripper.

Obviously the requirements for stripping operations vary widely. The vast multiplicity of modern finishes and primers . . . plus the wide selection of metals to which they can be applied . . . give rise to an extremely large number of possible combinations. In addition, the size and weight of the objects from which paint is to be removed make for further complications.

Diversey, therefore, offers a complete selection of six different paint strippers to provide the greatest possible flexibility. This chart will help you to evaluate the one which will supply the most efficient and economical answer to your particular requirements.

For complete information on any DIVERSTRIP paint stripper, see Diversey Technical Bulletins.

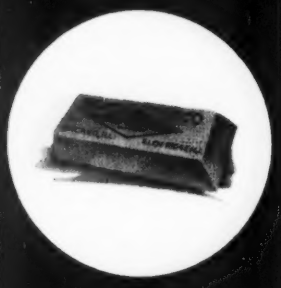
NAME AND GENERAL DESCRIPTION
BOND RELEASE OR SOLVENT TYPES
* **DIVERSTRIP S-90.** The fastest, most efficient "bond release" type stripper, for use in dip or soak applications. Wrinkles film and loosens bond between paint and metal, causing paint to peel off and not go into solution.
* **DIVERSTRIP S-70.** Economical "bond release" type stripper designed to provide maximum efficiency at minimum cost, in dip or soak applications. Action similar to S-90 above.
* **DIVERSTRIP T-100.** The fastest, most efficient "bond release" type stripper for use in spray or brush applications. Has high viscosity for maximum efficiency on vertical surfaces. Does not dissolve paint but loosens bond, so it can be flushed off.
* **DIVERSTRIP T-80.** Economical "bond release" stripper for use in spray or brush applications. Action similar to T-100 above. Provides maximum economy in majority of applications.
ALKALINE SOAK TYPE
DIVERSTRIP G-20. A new highly efficient and economical soak type stripper for use at elevated temperature. Dissolves paint film, also emulsifies or saponifies vehicle. Provides greatest economy. Pat. No. 2584017
ORGANIC SOAK TYPE
DIVERSTRIP O-50. A new fast acting cresol base stripper designed particularly for soak applications on zinc or magnesium . . . usually rapid stripping characteristics make it also advantageous on other metals. Quickly dissolves paint coating leaving a paint free surface. *PATS. PEND.

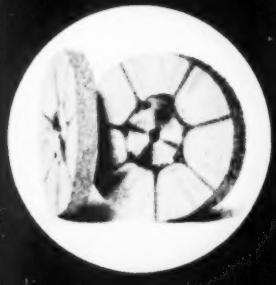
TO DIVERSEY PAINT STRIPPERS

METHOD of APPLICATION and APPLICATION TEMPERATURE	USE ON THESE FINISHES	USE ON THESE METALS	REMARKS
S-90 and S-70. Used in dip or soak applications at normal room temperature. Provide adequate ventilation. Solutions are used undiluted.	Epons, Alkyds, Acrylics, Silicones, Nitrocellulose, Butadiene Copolymers, Chlorinated Rubber, Drying Oil, Phenolics, Vinyls, Chromates and other modern finishes and primers.	Steel, cast iron, copper, brass and aluminum and any of their alloys. Can be used on zinc or magnesium and their alloys under most conditions.	Features high speed on difficult stripping operations. Rinses easily and completely from treated surface. Controlled evaporation provides longer solution life for greater economy. Packaged with net volumes of 5 gal. or 53 gal. non-returnable steel drums. Has no flash point . . . provides maximum safety.
			Rinses easily and completely from treated surface. Controlled evaporation provides longer solution life for greater economy. Has flash point of 118°F. (Tag open cup). Packaged with net volumes of 5 gal. or 53 gal. non-returnable steel drums.
Should be used undiluted at normal room temperature by either spray or brush application. Provide adequate ventilation.	Alkyds, Acrylic, Epons, Silicone, Phenolics, Ureas, Vinyls, Chlorinated Rubber, Nitrocellulose, Chromates and other modern finishes and primers.	Steel, cast iron, copper, brass and aluminum and any of their alloys. Can be used on zinc or magnesium and their alloys under most conditions.	Features high speed on difficult stripping operations. Has good flushing properties. Has no flash point . . . provides maximum safety. Rinses quickly and completely from treated surfaces. Packaged with net volume of 5 gal. or 53 gal. non-returnable steel drums.
			Has good flushing properties. Specially formulated to rinse quickly and completely from treated surfaces. Has flash point of 118°F. (Tag open cup). Packaged with net volumes of 5 gal. or 53 gal. non-returnable steel drums.
Used in solutions prepared by adding from 10 to 26 ounces per gallon of water. May be used at temperatures of 180°F. to boiling.	Alkyds, Butadiene Copolymers, Cellulose, Chlorinated Rubber, Drying Oils, Epons, Nitrocellulose, Phenolics, Urea . . . other modern primers and paints.	Steel, cast iron, copper, brass, magnesium and their alloys. Should not be used on zinc or aluminum and their alloys, unless etched surface is acceptable.	Has reserve stripping power for long solution life. Excellent for cleaning paint spray booth equipment. May be used in circulating water for paint screens, or applied in same manner as paint. Packaged in 425 lb. non-returnable steel drum.
Use in soak applications, diluted with 15% water by volume. Usually satisfactory at normal room temperatures. Faster stripping action obtained at elevated temperatures. Can be used at temperatures near boiling. Provide adequate ventilation. Personnel should wear rubberized canvas gloves, aprons, boots and goggles.	Acrylic Lacquers, Alkyds, Butadiene Copolymers, Chlorinated Rubber, Epons, Nitrocellulose, Phenolics, Silicones, Ureas, Vinyls and many other modern primers and finishes.	All metals except aluminum and its alloys. Particularly effective on zinc and magnesium and their alloys. May be used for stripping paint coatings from zinc plated surfaces without danger of removing the zinc.	Freezes at 38°F. Must be stored above this temperature. Is a non-flammable liquid. Packaged in 30 gal. non-returnable steel drums.

For complete information please write to Metal Industries Department, The Diversey Corporation, 1820 Roscoe Street, Chicago 13, Illinois.

DIVERSEY®





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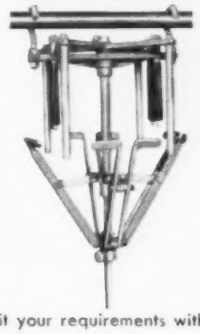

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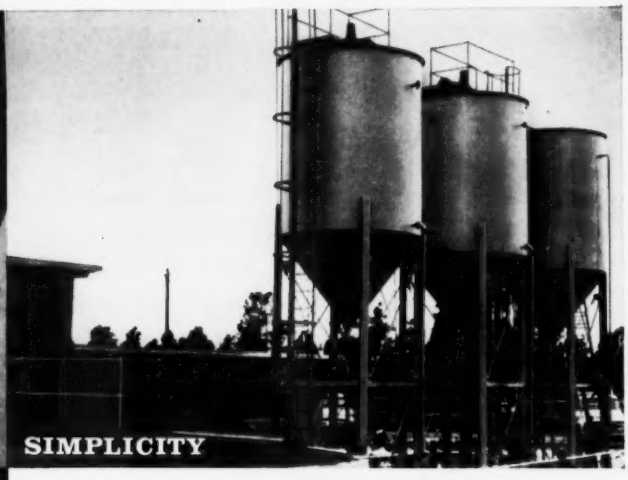
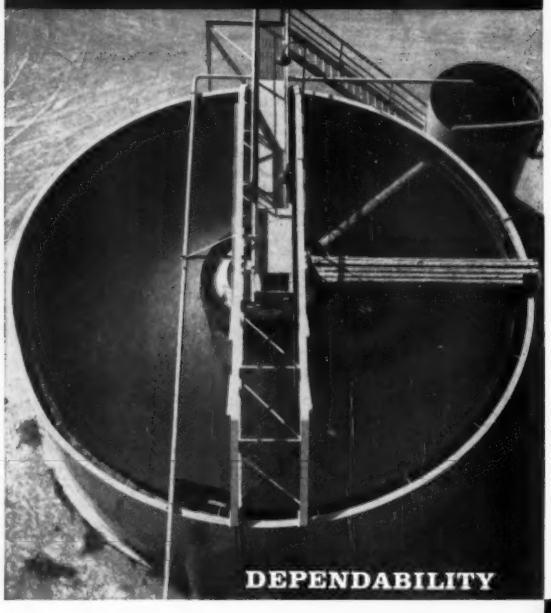


IN WASTE TREATMENT FOR THE PLATING INDUSTRY



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SAVINGS • SIMPLICITY • DEPENDABILITY

SAVINGS in a TV antenna plant. Graver ion exchange system results in savings of $2,000 a month on plating operation through elimination of bath dumping. System restores original bath quality and provides for better rinsing.

SIMPLICITY in a missile plant. Plating of missile parts requires over 10 processes resulting in chrome, cyanide, acid and alkali wastes. These wastes are collected from 120 plating tanks into three streams and treated by an integrated Graver plant providing for destruction and reduction of wastes. Central control board, simple operating charts keep operator time to a minimum.

DEPENDABILITY in an electronic controls plant. Cyanide, chrome, acid and alkali are treated separately and then sent to a Graver Reactivator® for complete precipitation of metals from water. Positive clarification is achieved on every load, as it has been since the treatment system was installed more than two years ago.

Your waste treatment plant can incorporate all three advantages. Perhaps no recovery is possible or desirable at your plant, yet you still get simplicity and dependability and save because of them through low requirements on equipment, time, labor and maintenance. Perhaps automatic operation is not indicated, yet with Graver you still get the simplest operating plant possible plus the other advantages. Graver offers equipment for all types of plating waste treatment in a wide range of industries. Our experience and the high quality design and construction of our units assure the most advantages in your waste treatment plant.

Request literature! Tell us about your plating problem and we will send you a case history study of how a similar problem was solved and how one plant, representative of many, benefited from Graver's trio of advantages—savings, simplicity and dependability.

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. . . a new gold electroplating process

A unique gold electroplating salt, which took many years to develop, has been invented by Paul T. Smith. This salt is incorporated in a gold electroplating formulation, to produce brilliant 24 karat electrodeposits to any specified thickness. The deposits are many times harder than conventional 24 karat gold electroplates, with a reading value of 245-260 knoops.

Neither cyanide, cyanide related products, nor acids are used in the process of "Brilliant Gold". The salt and the plating solution are non-toxic, and the bath operates at a wide alkaline pH range.

It is ideal for barrel plating transistors and other intricately designed electronic components. It also has a cathode current efficiency of 100%.

The bath is most economical to install since only 8.0-10.0 pennyweight of fine gold are required to initiate a new solution and no special tanks or equipment are needed.

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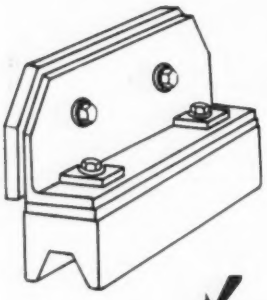
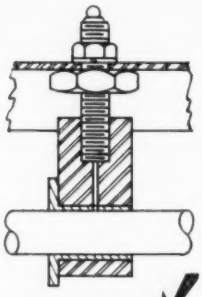
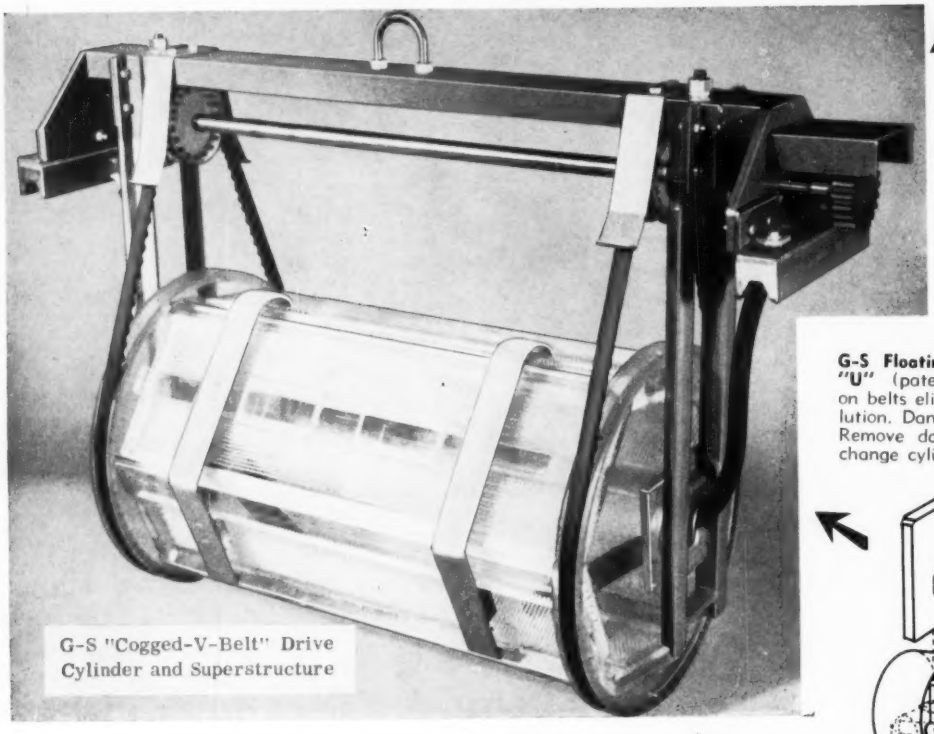


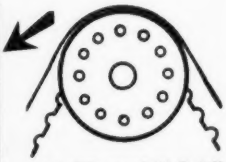
G-S Floating End Plates (patented) For constant contacts. **Inverted V-Contacts** provide 16" more contact area, up to 30% greater current flow.



G-S Adjustable Bearings (patented) Support drive shaft. Provide shaft adjustment to maintain constant mesh with motor drives.

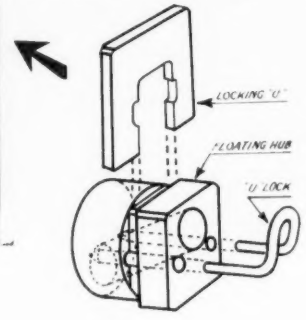


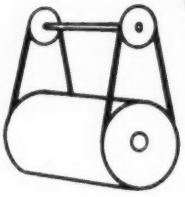
G-S "Cogged-V-Belt" Drive Cylinder and Superstructure



G-S "Cogged-V-Belt" Drive (patented) "The Belt-Drive with the Gear-Grip". Constant mesh, positive power transmission without gears. Can't slip, creep, vary speed.

G-S Floating Hubs with Locking "U" (patented) Cylinder weight on belts eliminates bearings in solution. Danglers angled downward. Remove danglers 10 secs. Interchange cylinders 5 mins.





G-S Belt Suspension (patented) Basic, original coverage of principle designating cylinder suspended by belts from drive shaft.

G-S means Greater Savings

Here's *positive protection* for your plating barrel investments *not possible with any other make* — at *any* price. *Only G-S* can give you so much more at *lower* cost. The reason: These *patented, exclusive G-S features* — the only major plating barrel improvements in a half century. You get these and other exclusive advantages, tested and approved, in every G-S barrel. No danger of inferior substitutes, uncertain imitations, experimental models. Hundreds of G-S equipped plants report bigger earnings from better, faster plating; lower maintenance costs. Compare all makes — construction, performance data, prices. You'll find G-S your *wisest* choice by *every standard.* Send for detailed information and prices on complete G-S plating plant equipment and accessories. *Write today!*

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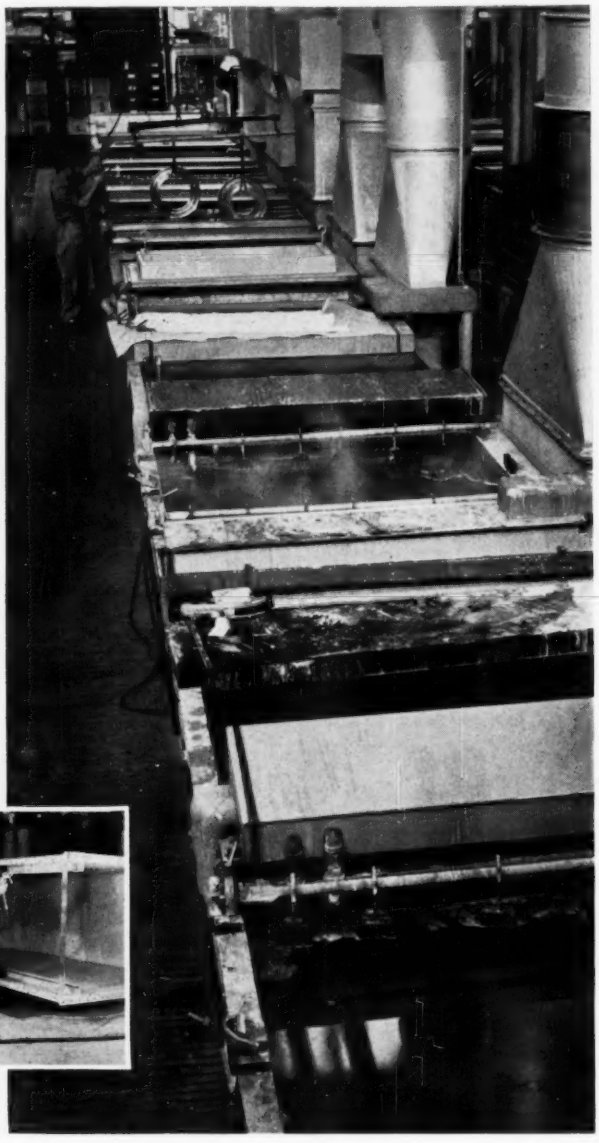
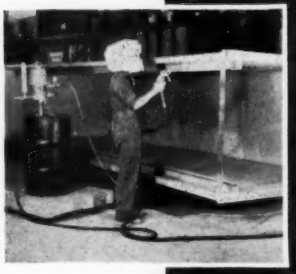
VACATION REMINDER:

Make plant down-time pay off
In life-time protection

Unichrome® "Super 5300" plastisol saves tanks and money





Lined with Unichrome Plastisol, the tanks at right are a few of hundreds made fit for a wide variety of plating and cleaning operations in one plant.

Sprayable "Super 5300" builds up thick vinyl film which blocks penetration of corrosive solutions. Large tanks fabricated in sections can be coated and then bolted after lining. Plastisol coating on tank **exteriors** (easily applied during lining) ends need for subsequent painting during plant maintenance.

...sprays seamless, pore-free protective coatings thick as sheet linings

MORE AND MORE plating plants are specifying Unichrome Plastisol instead of sheet lining for their tanks. One company, in fact, now has over 1000 cleaning and metal finishing tanks not only *lined* with this remarkably durable material, but "lifetime" coated on *exteriors* as well.

Such acceptance proves that Unichrome Plastisol protection *pays* . . . that it provides a completely *reliable* lining.

Unichrome "Super 5300" Plastisol sprays films of up to 60 mils thick per coat. Multiple coats build up thick as plastic or rubber sheets, deliver more dependable protection because they conform to irregular surfaces without air pockets or seams. They also cost less to apply.

The thick plastisol films have good flexibility and abrasion resistance to absorb mechanical abuse without harm. Should the coating be damaged, even years later, it can still be patched good as new.

Unichrome Plastisol securely seals tanks against corrosion, protects solutions from contamination. An acid and alkali resisting vinyl coating, its chemical inertness makes tanks more versatile . . . interchangeable for a wide variety of work.

Unichrome Plastisols are available in black, gray, green. Firms ready to coat *your* tanks and equipment are in key locations. Ask for names, or for Bulletin SP-1.

First name in plastisols for all plating purposes

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GENERAL OFFICES: RAHWAY, NEW JERSEY

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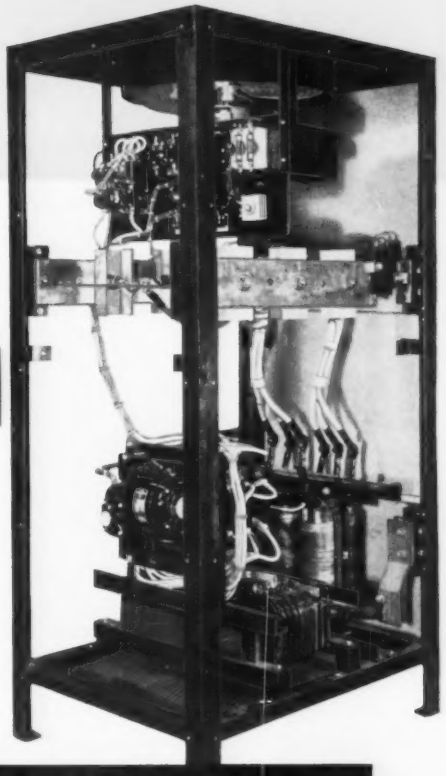
SILICON* RECTIFIERS

unsurpassed in overall efficiency!

*Amazing SILICON has proved to be far superior to any other element used for its specific purpose in plating rectifiers.

You no longer have to put up with excessive voltage drop due to aging. HERMETICALLY SEALED SILICON CELLS are practically NON-AGING, show little or no voltage drop throughout the life-time of the cell.

With SILICON CELLS, you no longer have to replace entire assembly should an individual cell fail. Single cells can be replaced in the unit without damage or change in the performance of the other cells in the unit, lowers your replacement cost.



MAXIMUM PERFORMANCE AND DEPENDABILITY!

You get bonus performance with **CROWN SILICON RECTIFIERS** in protection against overload. Crown supplies a minimum of **30% more cell capacity** than required for rated output.

...and here's good news! These highly efficient, economical, dependable, maximum performance **CROWN SILICON RECTIFIERS**** **cost no more** than old-style Selenium or Germanium Rectifiers.

**Available with integral or remote tap-switch control or with automatic voltage, current, and current density controls.

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REGCO DIVISION, Crown Chemical & Engineering Co.

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COATINGS
for Zinc and Cadmium

KER-CHRO-MITE P produces lustrous yellow or olive drab finish for zinc or cadmium. Supplied as powder. Needs only few ounces per gal. for optimum finish. Requires little care.

KER-CHRO-MITE #4 produces mirror-bright finish on zinc & cad. Ideal for fully auto-machines or manual vats. Costs about 1 to 2 tenths of a cent per sq. ft. Proven in the field by many years continuous and uninterrupted quality service.

KER-CHRO-MITE B brightens and passivates brass and copper.

KER-CHRO-MITE GC produces olive drab on cad. and zinc plate and its alloys. Has maximum protection. Excellent as paint base.

ZIN-K-LUX FC a newly improved zinc sol. brightener and purifier. Produces lustrous finish right out of the tank. Needs little care. Compatible with almost all addition agents.

ZIN-K-PURE inexpensive leveler and purifier for cyanide zinc solution.

CADLUX EC improved brightener for cadmium solution. Needs only a small amount for lustrous still or BBL plating.

BLACKENING SALTS for cadmium or zinc. Produces jet black finish.

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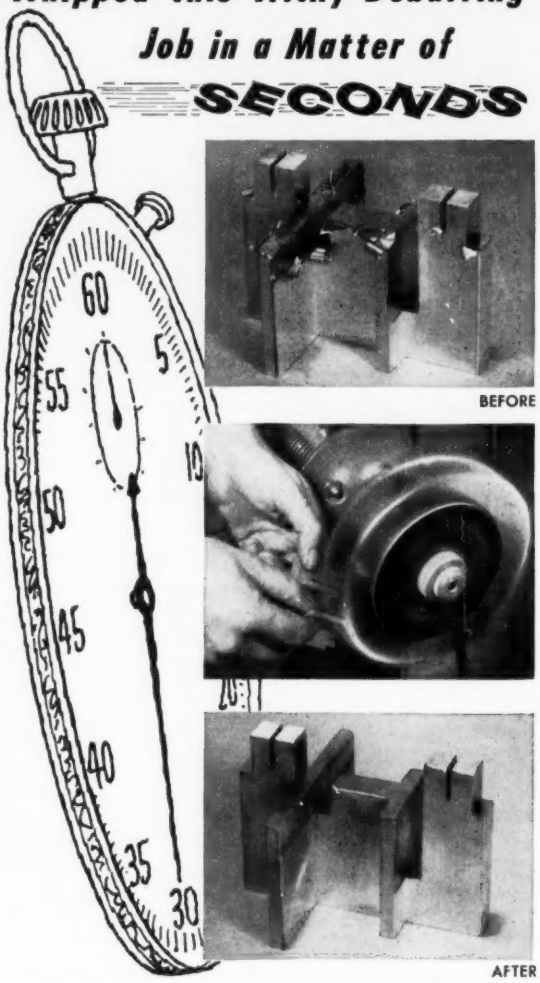

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to misses and lockets...

Exclusive Precious Metals Plating Processes to meet your every requirement

The newest rockets, guided missiles, earth and sun satellites have a SEL-REX PRECIOUS METAL ELECTROPLATE on their electronic equipment and circuitry. The same quality and precision demanded by such applications is also being provided to leading jewelry manufacturers to help them make better, more salable products—at lower cost.

Whether you make missiles and rockets or provide lockets for misses, there's an *exclusive* SEL-REX PRECIOUS METALS PLATING PROCESS to meet your particular needs.

* **SEL-REX BRIGHT GOLD** — the standard of the industry —twice as hard as ordinary 24K Gold Plate — mirror-bright in any thickness, directly from the bath.

* **AUTRONEX ACID GOLD** — for the exacting industrial application—mildly acid electrolyte—*absolutely no free cyanide*—plates at room temperature.

* **TEMPEREX** — produces pure 24 K Gold electroplate which will withstand higher temperatures than any pure Gold plate known.

* **RHODEX** — a patented Rhodium plating process which yields compressively stressed, crack-free deposits, permitting thicker Rhodium electroplate than ever before possible.

* **THERMOKARAT** — produces exceedingly hard (470 Vickers) 18K Gold electroplate for decorative or industrial applications.

* **KARATCLAD GOLD PROCESSES** — acid Gold processes for decorative applications—Jeweler's Finish in any thickness, in a wide range of non-varying colors.

* **BRIGHT RHODIUM PROCESS** — yields brilliant, fine grained, non-tarnishing deposits. Manufactured in our own air conditioned laboratories, its purity assures consistent quality results for all decorative applications.

* **PLATANEX BRIGHT PLATINUM** — mirror-bright Platinum electroplate of up to 5 microns in one continuous plating operation. No frequent removal of work from bath for scratch brushing or burnishing, no noxious fumes.

* **SILVREX BRIGHT SILVER** — mirror-bright deposits in any thickness, operates at room temperature in current densities from 10 to 40 asf—hard and ductile deposits.

* **SILVER SOL-U-SALT** — a water soluble double cyanide salt—permits new ease and facility in the preparation of Potassium Silver Cyanide plating solutions.

* **POTASSIUM GOLD CYANIDE** — the purest available—used in the preparation of our own exclusive Gold Plating Processes—manufactured in moisture controlled facilities.

* **INDUSTRIAL SILVER PLATING PROCESSES** — a complete line of silver plating formulations for high speed industrial applications.

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EXCLUSIVE SEL-REX PRECIOUS METALS PLATING PROCESSES:

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- ☐ TEMPEREX—HIGH TEMPERATURE GOLD
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- ☐ THERMOKARAT—HARD GOLD
- ☐ SILVREX BRIGHT SILVER
- ☐ KARATCLAD GOLD PROCESSES
- ☐ PLATANEX BRIGHT PLATINUM
- ☐ SILVER SOL-U-SALT
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- ☐ INDUSTRIAL SILVER PLATING PROCESSES

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- ☐ PRE-MET 600 SERIES
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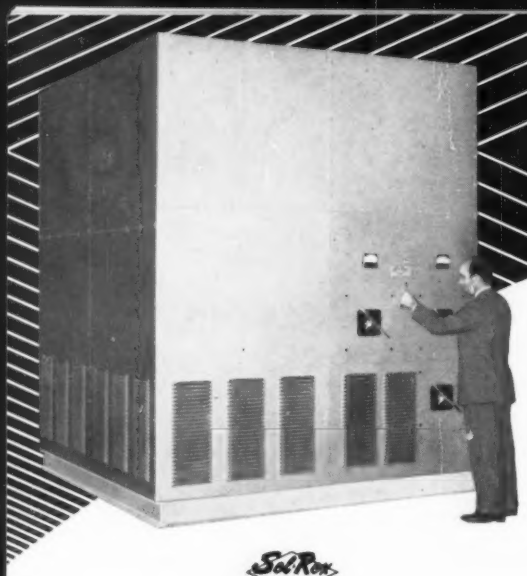

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Complete semiconductor power conversion systems for any AC to DC application.

Of the thousands of Sel-Rex Rectifiers in use, a large percentage are "repeat orders"—units purchased only after an original installation had proven itself. Units from 25 to 50,000 amps with manual, automatic and remote controls "custom-engineered" to *your* requirements—at no premium in cost.

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There's a model to meet your specific needs

Portable and mobile units for all liquid clarification needs of electroplating or other chemical solutions.

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For Precision High-Speed Precious Metals Plating.

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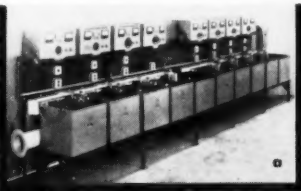
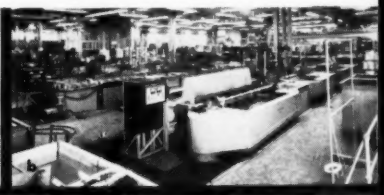
(a) Complete push-button plating facility designed and installed for leading manufacturer of aircraft components and scientific instruments.

(b) Electroplating cycle facility includes tanks and rectifiers for the plating of semiconductor products.





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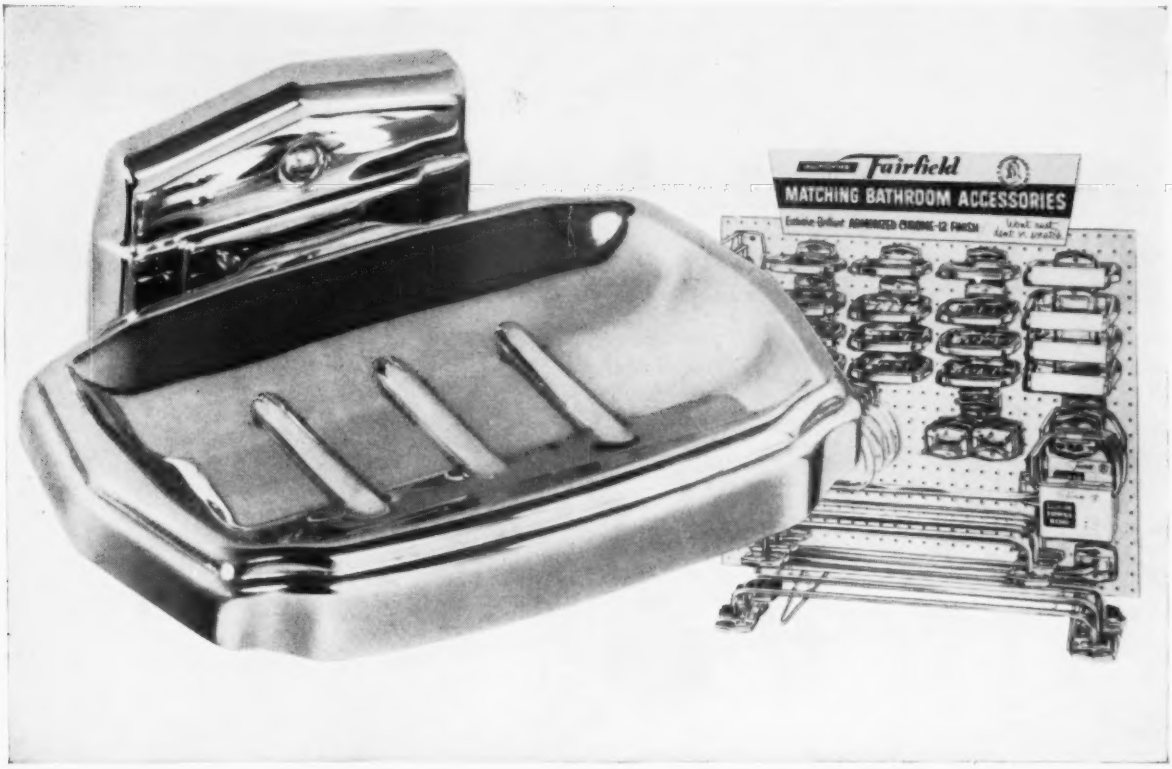

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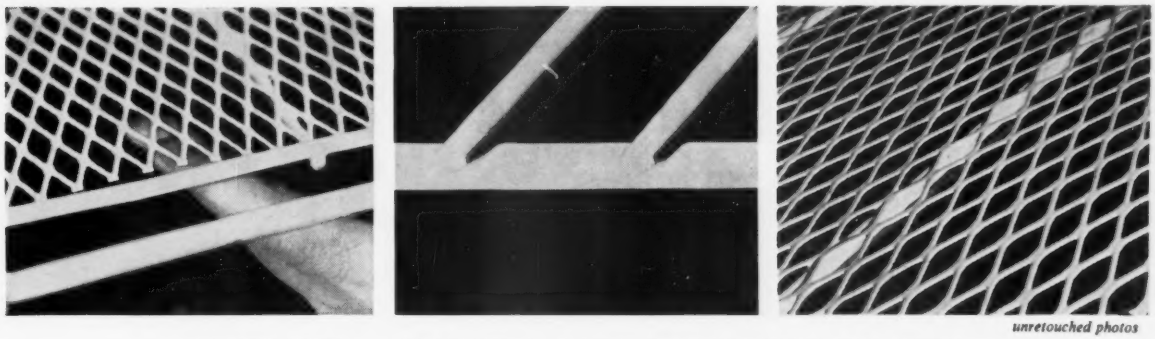

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New CORVEL† Cellulosic "fusion bond" Finishes . . .

Uniform coatings of controlled thickness—applied in a single dip without solvents—for lasting beauty and durability

CORVEL cellulosic finishes are specially processed dry powders, formulated for use in the patented* fluidized bed coating process. These finishes give you the following outstanding advantages:

- Complete protective finishes (approx. 0.008" to 0.032") obtained without solvents.
- Finish is unmarred by sags, drips, bare sections.
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Thus, CORVEL finishes can give your products improved durability and appearance at minimum cost.

Process licensing is now readily available. A process license is automatically extended to the purchaser of CORVEL powders from National Polymer Products, Inc., upon payment of a small royalty added to each sales invoice. General licenses to use the patented process can be obtained from Polymer Processes, Inc., an affiliate company.

Investigate the advantages of CORVEL cellulosic finishes. Details on the fluidized bed process and equipment are available. Other CORVEL finishes include vinyls, epoxies, nylon, polyethylene, and chlorinated polyethers.

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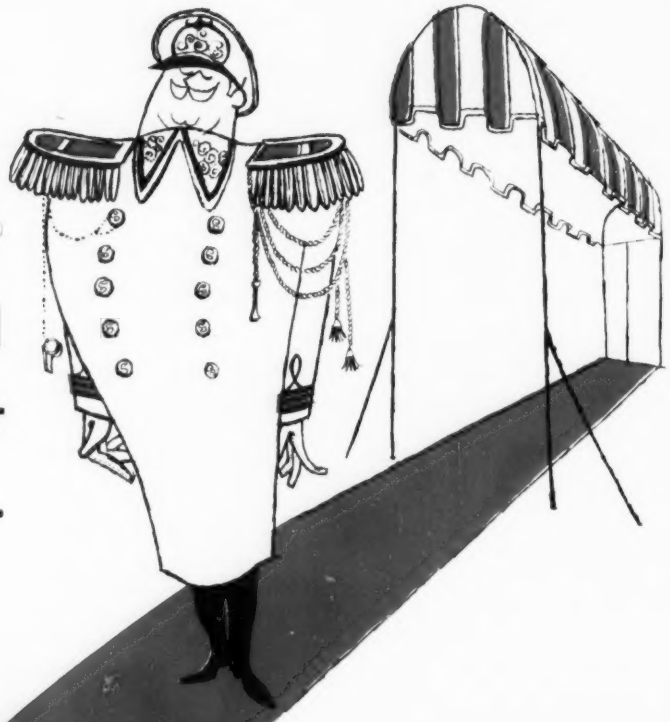
†Polymer Corporation trademark for finishing materials
*U.S. Patent 2,844,489 and over 30 patents pending

BOOTH NO. 81



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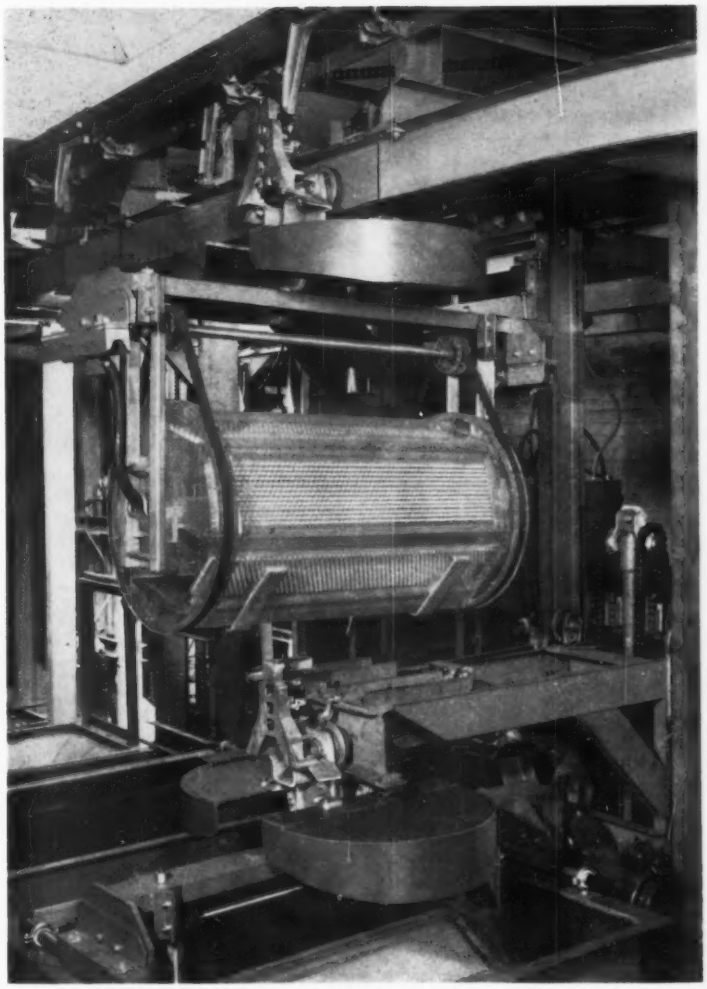
1. **ABBEY-Matic Key-Card Dispatch** (patented) pilots carriers through System with electro-mechanical precision. Eliminates errors possible with dials, etc.

2. **ABBEY-Matic Multi Cycle-Selection** (patented) provides for practically unlimited processing options — adjusts to your cycling requirements without the usual restrictions of conventional "automatics".

3. **ABBEY-Matic Multi-Process Flexibility** (patented) combines wide variety of related and unrelated processing in single System. Interchangeable Stations for simplifying, enlarging, reducing and "reshuffling" System. Adjustable Program Controls for timing and sequence variables *during* operation. Mixed Work Capacity practically unlimited — barrels, racks, etc., all sizes, shapes, weights, in single System.

4. **ABBEY-Matic Interchangeable Track Segments** (patented) permit carrier "leap-frogging". All automatic. While carriers are lowered into process stations on main track segments, "substitute" track segments fill gap in track for other carriers in transit to travel over occupied stations. No delays, no confusion. Carriers automatically "by-pass" unscheduled stations — no waste movements.

5. **ABBEY-Matic Switch Lines** (patented) Accumulation, Storage, Automatic Feed. Carriers are transferred laterally to enter supplementary sections or to short-cut unscheduled sections of System. All automatic.



(above) ABBEY-Matic station sections show barrel-carrier on overhead track "leap-frogging" another barrel-carrier lowered into station for processing. Notice use of interchangeable track segments. ABBEY-Matic also features AC, DC positive stationary contact; no arcing. Live entry. *Smoothest* sealed ball and roller bearings. *Hydraulic* action; and many more. Big reasons why leading industries are going ABBEY-Matic. Let us show you how ABBEY-Matic can cut your costs.

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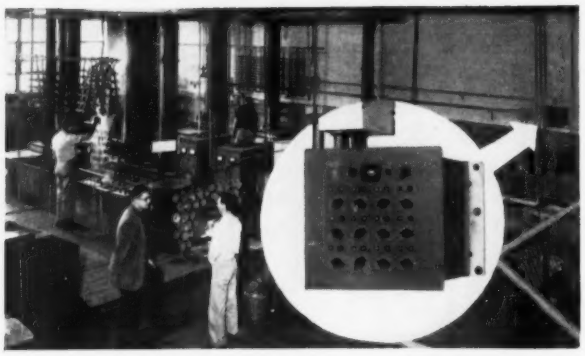

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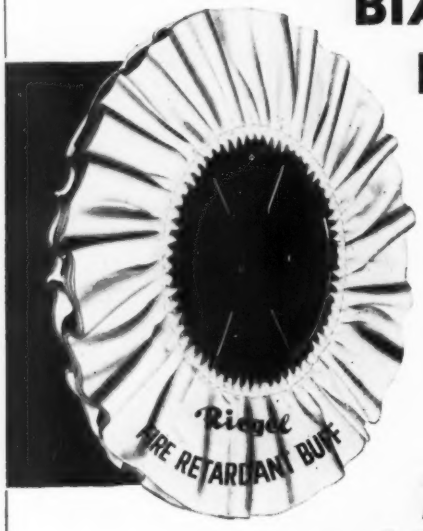

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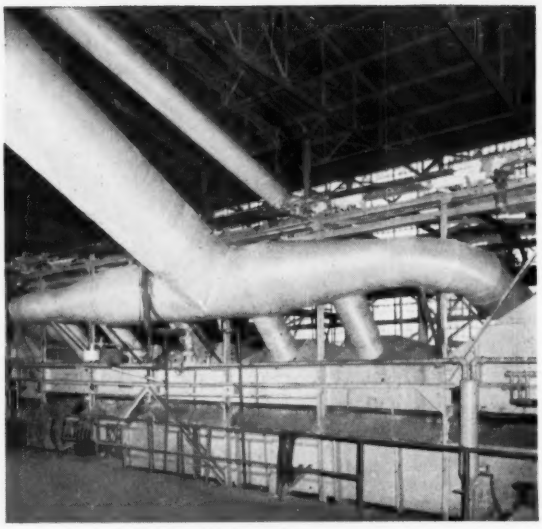

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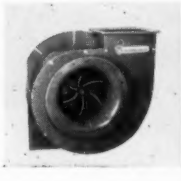
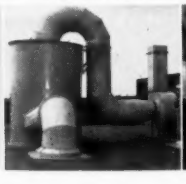


Heil Fume Scrubber Handling Corrosive Fumes.



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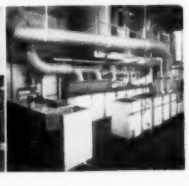

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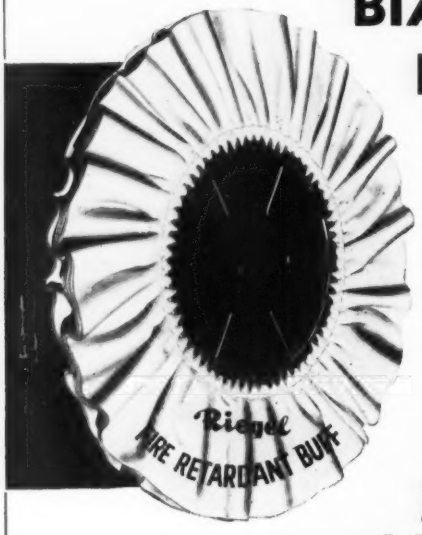

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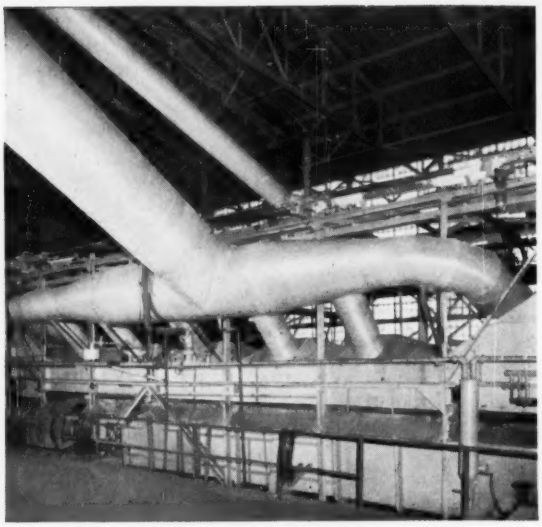

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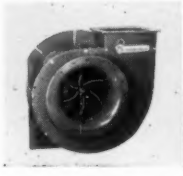
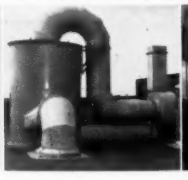
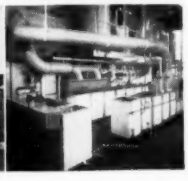
Heil Rigidon (Reinforced Plastic) Centrifugal Fan.



Heil Fume Scrubber Handling Corrosive Fumes.



Heil Ventilating System Handling Corrosive Fumes.



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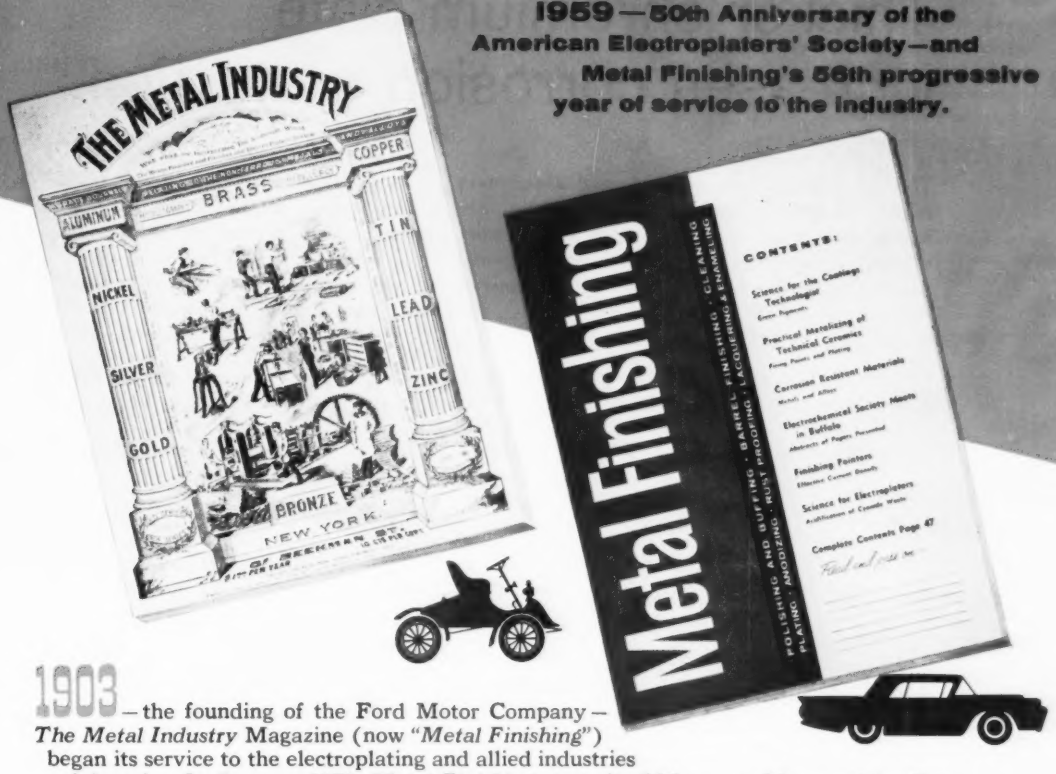


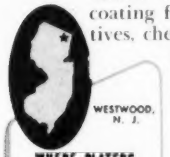
1903—the founding of the Ford Motor Company—*The Metal Industry* Magazine (now "*Metal Finishing*") began its service to the electroplating and allied industries of America. In January 1959, *Metal Finishing* starts its 56th year with an outstanding record of growth in circulation, breadth of editorial coverage and quality of readership.

GROWTH IN SIZE

Metal Finishing, recently combined with its companion publication, *Organic Finishing,* now offers a concentrated, unduplicated audience that incorporates the heart of each magazine's circulation.

Our paid circulation of $5.00 per year ($10.00 foreign) is now at an all time high and covers Polishing and Buffing, Barrel Finishing, Cleaning, Plating, Anodizing, Rustproofing, Lacquering, Enameling and Vacuum Metalizing departments.

The still-growing book . . . this year . . . goes to more individual companies in the plating and industrial coating fields; is read by more professional executives, chemists, metallurgists, project managers . . . more production executives, works, plant and production managers . . . more government procurement officers.



GROWTH IN QUALITY

Editorial staff now combines the outstanding authorities in *both* metal finishing and organic finishing areas. This is the most comprehensive, best-integrated staff *Metal Finishing* has ever offered — with the most extensive news-gathering machinery in its field.

Reader-appreciation of *Metal Finishing's* expanded service is at an all-time high. Hundreds of unsolicited letters and comments prove the value of how-to-do-it information, technical papers, stimulating articles on world-wide finishing developments, market trends, production figures, personnel changes. Readers paid a total of $36,063 for *Metal Finishing* during the year ending July 31, 1958.

Advertise in *Metal Finishing*—now, more than ever, the leading engineering magazine reaching the metal finishing and industrial coatings market.

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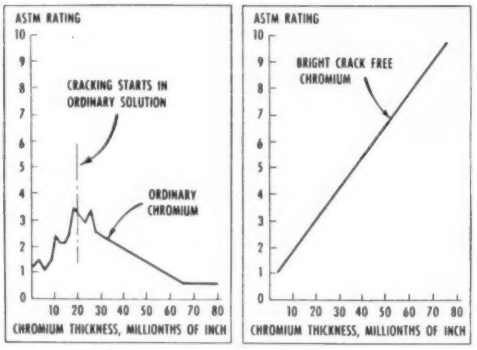
Thicker chromium plate increases corrosion protection

Thicker chromium in general, and Unichrome SRHS® and Crack-Free deposits especially, are doing more to increase protection against corrosion than any other change in decorative chromium plating in the past 25 years. Latest research demonstrates this.

As far back as 1928, it was shown that ordinary chromium plate soon reaches a critical thickness. (See graph A.) At a thickness of approximately .020 mils, the chromium cracks microscopically. Through these openings, corrosives can reach the



Graph A. Effect of increasing thickness of ordinary chromium on salt spray resistance . . . from Baker & Pinner data, SAE 1928. **Graph B.** Crack-Free Chromium ASTM corrosion ratings based on accelerated acetic acid salt spray tests.

undercoatings, and ultimately attack the base metal, ruining the appearance and function of the plated part.

Note, however, that before cracking commences, corrosion resistance *does* build up as the number of pores in the plate are reduced by the thicker deposit. Depending on undercoats, the effect of cracking can be modified.

DUCTILE CHROMIUM DOESN'T CRACK

But see what happens in the case of Unichrome Bright Crack-Free Chromium. (Graph B.) An innovation in plating, it plates as thick as desired for practical purposes – entirely without cracks – and, as thickness increases, corrosion-admitting pores are eliminated. Protection keeps rising.

BETTER PROTECTION IN RECESSES

In the past, corrosion usually appeared in recessed areas of parts where little or no chromium could be plated to protect the base metal. This problem, too, is solved by Unichrome Bright Crack-Free Chromium which gives much better coverage and throwing power than previous processes.

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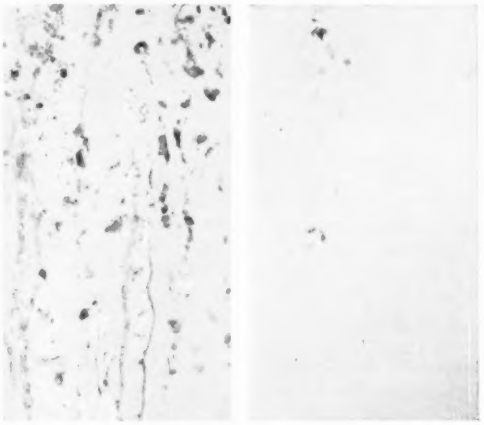
The corrosion protection of decorative chromium can be improved several ways. Unichrome Crack-Free Chromium can be used alone or in combination with other fast plating SRHS chromium processes. Combination of chromium deposits, impossible from a practical standpoint for 25 years, is now done commercially with SRHS and Crack-Free Chromium, thereby eliminating need for new, larger tanks and saving thousands of equipment dollars.



Effect of thickness of CRACK-FREE Chromium over thin undercoatings. (0.4 mil Nickel on steel) after 48 hours CASS test. Left — 0.015 mil Chromium; right — 0.045 mil Chromium.

A technical paper, "Thicker Decorative Chromium for Better Corrosion Resistance" gives more details. Write for your copy. METAL & THERMIT Corporation, Rahway, New Jersey.

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WESTWOOD, N. J.

Metal Finishing

POLISHING AND BUFFING · BARREL FINISHING · CLEANING
PLATING · ANODIZING · RUST PROOFING · LACQUERING & ENAMELING

JUNE, 1959 Volume 57 No. 6

FEATURES

Editorial — Triple Feature in Detroit 76A

A.E.S. Annual Convention and Industrial Finishing Exposition
- General Program 76C
- Technical Program 76F
- Abstracts of Papers 76G
- M.F.S.A. Program 76L
- List of Exhibitors 76M

N.A.M.F. Convention Program 76V

Better Buffing Thru Better Buff Design 77
By Stanley P. Sax

Rectifiers in the Electroplating Industry — Part II 82
By George Schore

Dip Dyeing of Finishes for Vacuum Metalizing 87
By Robert J. Perkel

Science for Electroplaters — Part XLVIII 90
By L. Serota

DEPARTMENTS

Shop Problems 94
Patents 97
Abstracts 100
Recent Developments 102
Manufacturers' Literature 123
Obituary 125
Business Items 125
Associations and Societies 137
News from California 143

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ESTABLISHED 1903 VOLUME 57 • NUMBER 6 • JUNE, 1959

TRIPLE FEATURE IN DETROIT

A dozen years ago Detroit was host to the Annual Convention of the *American Electroplaters' Society*. This month, the Motor City is again the scene of the finishing industry's most important event, but — with a difference! For, not only are we celebrating the Golden Jubilee of the A.E.S., but the meeting will also comprise the *Fifth International Conference on Electroplating and Metal Finishing*, which will feature some 45 technical papers delivered by scientists from ten countries. And, as if this weren't enough to highlight the event, the *Fifth Industrial Finishing Exposition* is being run in conjunction with the Convention.

There will be much to see, to hear, to do, and to learn during June 15-19, for both conventioneers and their ladies. Tours have been arranged to the Ford Rouge plant, where visitors will see how automobiles are manufactured, and to the world-famous General Motors Technical Center, the home of that industrial giant's research and development in styling and engineering. At the Detroit Artillery Armory, finishers will have a rare opportunity of examining at close range the latest developments in equipment, supplies, and processes, and of conferring with experts from all the leading companies in our industry. The provision of chartered buses for transportation between the Armory and convention headquarters on a regular schedule is only one example of the careful planning which has gone into the preparation for this event, and for which the various hardworking committees are to be congratulated. They have carried out a thankless task with real credit to themselves and to the Society.

Every year, at this time, we remind our readers of the advantages to be derived from attendance; renewing old acquaintanceships, making new friends and contacts, learning about recent and more efficient production methods. The traveler expects to have a good time but, more to the point, he also expects to return a wiser and more experienced finisher, which is why we emphasize the educational rather than the diversionary aspects.

We must not forget to mention, in passing, that among the exhibits there will be some of historic interest. This year, therefore, the conventioneer will be able to see and to profit from the past, the present, and the future. An opportunity such as this does not often present itself and will be long remembered. It should not be thrown away!

Nathaniel Hall

A. E. S. CONVENTION

FINISHING EXPOSITION

DETROIT, JUNE 15-19

Herberth E. Head

President of the American Electroplaters' Society and member of the Detroit Branch, served as an advisor to the 1959 Convention and Exposition Committees.

Dynamic Detroit is definitely the place for every metal finisher to be from June 15th through 19th. As publicized in advance, the committees in charge of the American Electroplaters' Society Golden Jubilee Convention and the Fifth Industrial Finishing Exposition have approached the opening date with events that will come up to or exceed all expectations.

Howard J. McAleer, exposition chairman, and *L. G. Belanger,* manager of space sales, have announced that all exhibit space has been taken.

With 134 firms exhibiting, the exposition will be by far the largest in the history of these events. It will be held in the modern Detroit Artillery Armory, located at 15000 W. Eighth Mile Road in Oak Park, and will take up 34,675 square feet of floor space. Chartered buses will run on a regular schedule between the Armory and the headquarters hotel, the Statler-Hilton. The exposition will open Tuesday morning and run through Friday. See General Program for hours.

Irving A. Duffy
Keynote Speaker

The AES convention, in addition to celebrating the fiftieth anniversary of the society's founding by the late *Charles H. Proctor,* will have an International aspect, being also the Fifth International Conference on Electrodeposition and Metal Finishing.

Wright Wilson is the general chairman of the convention and *Walter L. Pinner* arranged the educational program which includes technical papers from many countries. *Herberth E. Head,* supreme president of the AES, who was instrumental in bringing this convention to Detroit, acted in an advisory capacity on both convention and exposition committees. The Institute of Metal Finishing (British) will be represented by their secretary, *Dr. S. Wernick.*

The registration schedule is as follows:

At the Statler-Hilton Hotel:

Sunday	1:00 P.M.-9:00 P.M.
Monday	8:30 A.M.-9.00 P.M.
Tuesday	8:30 A.M.-1.00 P.M.
Wednesday	8:30 A.M.-1.00 P.M.
Thursday	8:30 A.M.-1.00 P.M.

At the Armory:

Monday	1:00 P.M.-9.00 P.M.
Tuesday	9:00 A.M.-5.00 P.M.
Wednesday	9:00 A.M.-5.00 P.M.

There will be a Get-Together Party for early arrivals at 8:00 P.M. Sunday evening at which soft drinks and refreshments will be served. Officially, the convention gets under way at 10:00 A.M. Monday morning in the Statler-Hilton Ballroom when *Irving A. Duffy,* vice-president of the body group of the Ford Motor Co., will make the keynote address. Mr. Duffy's responsibilities include metal stamping, hardware and accessories, the steel and glass divisions, and manufacturing service activities, and he is also a member of the board of directors. He joined Ford in 1949 as purchasing director.

Two of the AES educational sessions will be held at the Armory and the annual outing, always a popular feature of these conventions, will be held on the Armory grounds. This year the outing will feature games of chance and an ox roast.

Plant visitation trips for men are scheduled for Ford, Chrysler and the General Motors Technical center.

At the AES business meeting some changes in the constitution will be up for discussion, including a proposal to raise the per capita tax (the amount of individual dues going to the National Society) from $5.70 to $10.00 effective July 1st. The resolution initiating this change has the backing of the following branches: Baltimore, Washington, Boston, Columbus, Grand Rapids and the St. Joseph Valley. If passed upon, this would be the first increase since 1946 in this levy on the branches.

A new third vice-president will be elected. The announced candidate for this office is *Arthur G. Pierdon,* president of the Art Metal Finishing Company of Washington, D. C., who is active in the Baltimore - Washington

branch and who acted as general chairman of the National Convention held in Washington in 1956.

Mrs. Alice Pillsbury, as chairman of the ladies' activities, has arranged a program which includes a luncheon at the Detroit Yacht Club, a visit to the Dearborn Inn and Greenfield Village, a boat trip on the Detroit River, and a style show at the Chrysler Corporation. Ladies are welcome, of course, at the Industrial Finishing Exposition.

In addition to all the convention and exposition attractions, Detroit has a great deal to offer visitors: Greenfield Village, tours through auto plants, Edison Institute, the natural moat zoo, the new waterfront development, Cranbrook, and Belle Isle.

The *Metal Finishing Suppliers' Association*, headed up by *Earle W. Couch*, will again play an important part in giving the annual Open House Party on Monday evening and sponsoring a golf tournament. *Dee F. Mosher* of this group worked with the convention and exposition committee in making arrangements for the MFSA program.

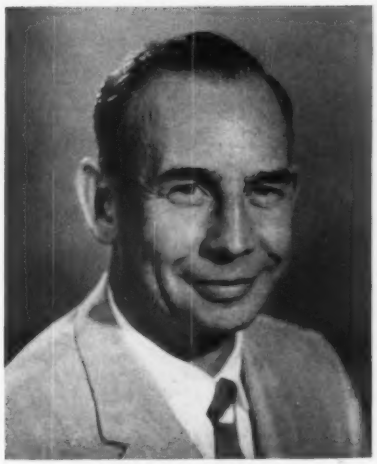
As in recent years, the *National Association of Metal Finishers* will hold their annual meeting concurrently with the AES, featuring seminar sessions on job shop management problems and a banquet. Their complete program will be found in this section.

For hotel reservations write *Mrs. Dorothy Garrett*, Housing Committee, Detroit Convention and Tourist Bureau, 626 Book Building, Detroit 26, Mich.

When you cover the exposition you are urged to call at the *Metal Finishing* booth which will be historical in theme.

Charles H. Proctor
Founder

Wright Wilson
General Chairman



Howard John McAleer
Exposition Chairman

We were selected by the exposition committee to portray early history in this portion of the jubilee celebration because our publication dates back to 1903, six years before the AES was founded. Therefore, we have assembled a collection of "first finishes" on metal products and items relating to the early history of the finishing industry, which will be on exhibit.

General Program

All events are at the Statler-Hilton Hotel or at the Artillery Armory, 15000 West 8 Mile Road, Oak Park, Michigan, unless otherwise noted. Two educational sessions will be held at the Artillery Armory, all others at the Statler-Hilton. Eastern Daylight Saving Time applies to all events. Registration fee is $20 each.

Sunday, June 14

9:00 a.m.—***Hq. Room (Parlor B)***
Executive Board Meeting.

1:00-8:00 p.m.—***Foyer***
Registration.

3:00-5:00 p.m.—***English Room***
Ladies Tea (Sponsored by Siefen Compounds, Inc.)

4:00 p.m.—***Parlor B***
Credentials Committee Meeting.

4:00 p.m.—***Parlor F***
AES Scientific Achievement Award Committee Meeting.

8:00 p.m.—***Grand Ballroom***
Golden Jubilee Get-Together Party.

Monday, June 15

8:30 a.m.-5:30 p.m.—***Foyer***
Registration.

9:00 a.m.—***Sheraton Cadillac Hotel***
Metal Finishing Suppliers' Association Board of Trustees Meeting.

10:00 a.m.—***Grand Ballroom***
Grand Opening, Golden Jubilee Convention.

11:00 a.m.—***Grand Ballroom***
Opening Session and Keynote Address.

12:00 noon—***Crystal Ballroom, Sheraton Cadillac Hotel***
Metal Finishing Suppliers' Association Luncheon and Annual Meeting.

12:00 noon—***English Room***
Branch Secretaries Luncheon.

12:00 noon—***Parlor E***
Speakers' Luncheon.

12:00 noon—***Bus from Statler-Hilton***
Ladies Program Luncheon at Detroit Yacht Club. (Co-sponsored by Allied Research Products, Inc., and Pillsbury Chemicals) Special Entertainment. Ladies Plato Party at 2:15 p.m., Joan T. Wiarda, hostess. Prizes donated by the J. J. Siefen Co.

2:00 p.m.—***Grand Ballroom***
Opening Educational Session A, International Conference on Electrodeposition and Metal Finishing.

3:00 p.m.—***Parlor E***
Editorial Board Meeting.

4:30 p.m.—***Parlor F***
Order of Past Presidents, Business Meeting.

6:30 p.m.—***English Room***
Past Presidents' Dinner.

7:00-9:00 p.m.—***Foyer***
Registration.

8:00 p.m.—***Crystal, Grand and Founders Ballrooms in Sheraton-Cadillac Hotel***
Metal Finishing Suppliers' Association Open House
Buffet Supper 8:00-9:00. Dancing 9:00-12:00 a.m.

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Chester G. Borlet
3rd Vice-Pres.

Francis T. Eddy
Past President

John P. Nichols
Exec. Sec'y.

Tuesday, June 16

8:00 a.m.—*Parlor F*
Research Committee Breakfast.

8:00 a.m.—*Parlor C*
Speakers' Breakfast.

8:30 a.m.-1:00 p.m.—*Foyer*
Registration.

9:00 a.m.—*Grand Ballroom*
Educational Session B, International Conference.

9:00 a.m.—*Michigan Room*
Educational Session C, International Conference.

9:00 a.m.—*Parlor F*
Research Committee Meeting.

9:00 a.m.—*Parlor E*
Educational Committee Meeting.

9:30 a.m.—*Bus from Statler-Hilton*
Plant Visit, Ford Motor Company (Rouge Plant), Dearborn, Michigan.

10:00 a.m.-9:00 p.m.—*Artillery Armory*
Industrial Finishing Exposition.

11:00 a.m.—*Bus from Statler-Hilton*
Ladies Program. Trip to Dearborn Inn—Luncheon and Entertainment. (Sponsored by Oakite Products, Inc.) Followed by Tour of Edison Institute and Greenfield Village.

12:00 noon—*English Room*
Branch Librarians' and Educational Committee Luncheon.

12:00 noon—*Parlor C*
Speakers' Luncheon.

2:00 p.m.—*Artillery Armory*
Special Ceremony, Industrial Finishing Exposition.

2:00 p.m.—*Parlor F*
Research Committee Meeting.

2:30 p.m.—*Artillery Armory*
Educational Session D, International Conference.

Wednesday, June 17

8:00 a.m.—*Parlor F*
Membership Committee Breakfast.

8:00 a.m.—*Parlor E*
Speakers' Breakfast.

8:30 a.m.-1:00 p.m.—*Foyer*
Registration.

8:30 a.m.—*Bagley Room*
Joint Meeting, MFSA and NAMF.

8:30 a.m.—*Pine Lake Country Club, Pontiac, Mich.*
Metal Finishing Suppliers' Association Golf Tournament.

8:45 a.m.—*Bus from Statler-Hilton*
Ladies Program. Lake St. Clair Cruise on the *S.S. Aquarama* (Luncheon). (Co-sponsored by J. J. Siefen Co. and Northwest Chemical Co.)

9:00 a.m.—*English Room*
Public Relations Committee Meeting.

9:00 a.m.—*Parlor F*
Membership Committee Meeting.

9:00 a.m.—*Grand Ballroom*
Educational Session E, International Conference.

9:00 a.m.—*Michigan Room*
Educational Session F, International Conference.

Convention Committee

Mrs. Alice Pillsbury
Ladies

Robert C. Trees
Publicity & Program

Walter L. Pinner
Educational Chairman

Donald C. Austin
Registration

Wm. P. Katke, Jr.
Hotel

9:30 a.m.—*Bus from Statler-Hilton*
Plant Visit, Chrysler Engineering Laboratory.

10:00 a.m.-9:00 p.m.—*Artillery Armory*
Industrial Finishing Exposition.

4:00 p.m.—*Artillery Armory Grounds*
Golden Jubilee Outing (Millionaire's Party followed by Barbecue) for AES registrants only. Ox roast begins at 6 p.m.

Robert H. Dudley
Outing

Thursday, June 18

8:00 a.m.—*Parlor F*
Speakers' Breakfast.

8:30 a.m.-1:00 p.m.—*Foyer*
Registration.

9:00 a.m.—*Wayne Room*
Business Meeting, Supreme Society.

9:00 a.m.—*Grand Ballroom*
Educational Session G, International Conference.

9:00 a.m.—*Bus from Statler-Hilton*
Plant Visit, General Motors, Technical Center, Warren, Michigan.

10:00 a.m.-4:00 p.m.—*Artillery Armory*
Industrial Finishing Exposition.

11:00 a.m.—*Bus to Chrysler from Statler-Hilton*
Ladies Program, Brunch at Devon Gables, Bloomfield Hills (Sponsored by The Udylite Corp.) followed by Auto Styling Show at Chrysler Corporation and Tea.

12:00 noon—*Parlor F*
Speakers' Luncheon.

2:00 p.m.—*Wayne Room*
Business Meeting, Supreme Society.

2:30 p.m.—*Grand Ballroom*
Educational Session H, International Conference.

7:00 p.m.—*Statler-Hilton*
Golden Jubilee Banquet, Floor Show and Dance.

A. J. Turner
Entertainment

James E. Fritts
Plant Visitation

Friday, June 19

8:00 a.m.—*President's Suite*
President's Breakfast (National Officers and Wives).

8:00 a.m.—*Parlor F*
Speakers' Breakfast.

8:30 a.m.—*Bus from Statler Hilton*
Ladies Program, Ford Motor Company Tour and Luncheon.

9:00 a.m.—*Parlor B*
Executive Board Meeting.

9:00 a.m.—*Grand Ballroom*
Educational Session I, International Conference.

9:00 a.m.—*Michigan Room*
Educational Session J, International Conference.

10:00 a.m.-6:00 p.m.—*Artillery Armory*
Industrial Finishing Exposition.

12:00 noon—*Parlor F*
Speakers' Luncheon.

2:30 p.m.—*Artillery Armory*
Educational Session K, International Conference.

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Hotel

John F. Seifen
Finance

H. E. Nice
Hotel

Donald M. Bigge
Banquet

Charles L. Southwick
Transportation

Ed Kubis
Secretary

Dee F. Mosher
Liaison
MFSA - AES

Technical Program

Monday, June 15, 1959

2:00 p.m.—Grand Ballroom

Session A

Chairman: *Dr. T. P. Hoar,* Institute of Metal Finishing (England).

1. The William Blum Lecture—Education and the Electroplating Industry, *Dr. William Blum.*
2. Problems Encountered in the Application of Pre-Finished Metal, *Dr. S. Wernick,* Institute of Metal Finishing (England).
3. Development and Application of Ultrasonic Cleaning, *J. Zucker,* Technochemie AG (Switzerland).
4. Experimental Studies of the Electrodeposition of Metals in Narrow Crevices, *Dr. Henry Leidheiser, Jr.* and *Mrs. Lucille B. Garmon,* Virginia Institute for Scientific Research.

Tuesday, June 16, 1959

2:00 p.m.—Grand Ballroom

Session B

Chairman: *G. Ross Davidson,* Canadian Hanson & Van Winkle Co., Ltd., (Canada).

1. A Black Chromium Plating Process, *Dr. A. Kenneth Graham,* Graham, Savage & Assoc.
2. Leveling Power of Copper Sulphate Baths with Complexing Addition Agents, *Prof. Eugenio Bertorelle,* Faculty of Sciences; *Dr. I. R. Bellobono,* and *Dr. A. Scarati* (Italy).
3. Plating Zinc on Steel from Pyrophosphate Solution — A Pilot Plant Investigation, *Dr. U. F. Marx,* Wilmot Breeden Laboratories, and *D. Povey* (England).
4. Electrodeposition of Nickel Alloys from the Pyrophosphate Bath, *Dr. T. L. Rama Char,* Indian Institute of Science (India).

9:00 a.m.—Michigan Room

Session C

Chairman: *Leslie L. Diveley,* Cutler-Hammer Inc.

1. Chemical Conversion Coatings, *R. F. Ayres,* Oakite Products, Inc.
2. The Metal Surface Conversion Coating as a Paint Base, *Dr. R. C. Gibson,* Adrian College.
3. The Accelerated Weathering of Organic Finishes, *A. A. B. Harvey,* Sunbeam Anti-Corrosives Ltd. (England).
4. Surface Texture: Its Influence on Organic Finishing, *Dr. W. Stein,* Joseph Lucas, Ltd. and *D. H. Lloyd,* Fisher & Ludlow Ltd. (England).

2:30 p.m.

(Detroit Artillery Armory)

Session D

Chairman: *William M. Phillips.*

1. The Influence of the Physical Metallurgy and Mechanical Processing of the Basis Metal on Electroplating — Ferrous Metal Conditions Affecting the Durability of Watts Nickel Deposits, *Dr. M. H. Jones, Dr. Chih-Yeu Lu, Dr. A. F. Mohrnheim,* and *J. Zajdowski,* Ontario Research Foundation (Canada).
2. The Nature of Mechanically Polished Surfaces, *L. E. Samuels,* Defence Standards Laboratories (Australia).
3. Outdoor Corrosion Results with Chromium-Nickel-Chromium Plate, *Dr. Henry Brown* and *M. Weinberg,* Udylite Research Corp.
4. Improved Corrosion Resistance for Electroplated Die Castings, *Dr. Charles L. Faust, Hugh R. Miller,* and *Wm. H. Safranek,* Battelle Memorial Institute.

Wednesday, June 17, 1959

9:00 a.m.—Grand Ballroom

Session E

Chairman: *Clarence H. Sample,* The International Nickel Co.

1. Corrosion Testing of Electrodeposited Coatings, *F. L. LaQue,* The International Nickel Co.
2. Experience with the Use of the Corrodkote Test, *D. M. Bigge,* Chrysler Corp.
3. Sulphur Dioxide Accelerated Corrosion Test — Testing Conditions and Equipment, *Dr. J. Edwards,* The British Non-Ferrous Metals Research Association (England).
4. The Copper Chloride Modification of the Acetic Acid Salt Spray Test, *C. F. Nixon,* General Motors Corp.

9:00 a.m.—Michigan Room

Session F

Chairman: *Ralph D. Wysong,* Studebaker-Packard Corp.

1. Water-Soluble Coatings for Metal Finishing, *R. A. Boller,* Archer Daniels-Midland Co.
2. Epon Resin Coatings for the Electroplating Industry, *H. W. Howard,* Shell Chemical Corp.
3. Vinyl Dispersions: Their Use in Metal Finishing, *M. Perez,* Metal & Thermit Corp.

Thursday, June 18, 1959

9:00 a.m.—Grand Ballroom

Session G

Chairman: *Dr. S. Wernick,* Institute of Metal Finishing (England).

1. The Effect of Flow Rate and Current Density on the Electrolytic Removal Rate of Iron and Copper from a Watts Nickel Solution, *Dr. Abraham M. Max* and *M. L. Whitehurst,* Radio Corp. of America.
2. Chromium in Cyanide Solutions and its Removal, *Dr. Erich Laue,* MacDermid Inc.
3. The Effect of Shot-peening and of Grinding on the Fatigue Strength of Chromium Plated High Strength Steel, *Dr. R. A. F. Hammond* and *C. Williams,* Ministry of Supply (England).
4. Some Aspects of the Corrosion of Decorative Plated Coatings, *Dr. F. A. Lowenheim,* Metal & Thermit Corp., and *W. H. Rowan.*

2:30 p.m.—Grand Ballroom

Session H

Chairman: *Ezra A. Blount,* Products Finishing.

1. European Bright Anodizing Practice, *A. W. Brace,* Aluminium Laboratories Ltd. (England).
2. Hydration of Anodic Oxide Films, *M. S.*

Dr. T. P. Hoar

G. Ross Davidson

Leslie L. Diveley

William M. Phillips

Clarence H. Sample

Ralph D. Wysong

Dr. S. Wernick

Ezra A. Blount

A. W. Wallbank

A. A. B. Harvey

Dr. Abner Brenner

Dr. P. A. Jacquet

Hunter, P. F. Towner and *D. L. Robinson*, Aluminum Company of America.

3. Anodizing Processes for the Production of Very Thick Alumina Films, *R. Segond*, Societe Procol; *P. LeLong*, Centre de Recherches d'Antony; and *J. Herenguel*, Societe des Trefileries et Laminoirs du Havre (France).
4. Developments in the Surface Treatment of Aluminum — Processes and Materials, *Dr. R. Lattey*, VAW Research Center (Germany).

Friday, June 19, 1959

9:00 a.m.—Grand Ballroom

Session I

Chairman: *A. W. Wallbank*, Ionic Plating Co., Ltd. (England).

1. Electrochemical Techniques in Modern Metallography, *Dr. Pierre A. Jacquet*, Societe Jacquet-Hispano Suiza (France).
2. The Present State of Electrolytic Polishing in Europe, *Robert Mondon*, Societe Jacquet-Hispano Suiza (France).
3. Electroless Copper Plating, *Dr. E. B. Saubestre*, Enthone, Inc.
4. Some Chemical Polishing Processes — Their Mechanism and Their Application, *Dr. H. Spahn*, Institut Fur Werkstoffkunde (Germany).
5. Influence of Various Surface Treatments on the Resistance to Fatigue of Two High Strength Aluminum Alloys, *G. Abadie*, Societe d'Exploitation des Materiels Hispano-Suiza, and *G. Vidal*, Office National d'Etudes et de Recherches Aeronautiques (France).

9:00 a.m.—Michigan Room

Session J

Chairman: *A. A. B. Harvey*, Sunbeam Anti-Corrosives Ltd. (England).

1. The Effect of Metal Preparation on the Performance of Water Thinned Coatings, *R. A. Williams*, Rinshed-Mason Co.
2. Vinyls in Modern Industrial Coatings, *W. H. McKnight*, Bakelite Co.
3. Protecting Silver and Copper Against Tarnishing by Means of a Chromate Passivating Process, *Dr. P. Baeyens* and *J. L. Melse*, N. V. Philips Laboratory (Holland).
4. Chromic Acid Anodizing Characteristics of Wrought Aluminum Alloys, *George E. Best*, Allied Chemical Corp.; *J. G. Heckers, Jr.* and *R. V. VandenBerg*, Aluminum Company of America; *John W. McGraw*, The Martin Co.

2:30 p.m.

(Detroit Artillery Armory)

Session K

Chairman: *Dr. Abner Brenner*, National Bureau of Standards.

1. Barrel Plating with Special Consideration to Protection of Thread Diameters, *A. W. Wallbank*, Ionic Plating Co., Ltd. (England).
2. Ductility in Plated Coatings, *Dr. H. J. Read*, Pennsylvania State University, and *Thomas J. Whalen*, The Ford Motor Co.
3. Grain Size Control in Electroforming, *H. D. Hughes*, Metachemical Processes Ltd. (England).
4. Electrodeposits as Resists in Selective Heat Treating, *R. Scott Modjeska* and *S. P. Gary*, Scientific Control Laboratories.

Abstracts of Papers

The William Blum Lecture Education and the Electroplating Industry

By Dr. William Blum

The electroplating industry should prepare to take its proper place in our complex civilization, and to meet the challenge of the space age. To do so it is necessary to educate not only apprentices and foreman platers, but also works chemists, research chemists, plant executives, design engineers, and the general public who purchase plated products. Channels for such education are suggested.

Problems Encountered in the Application of Pre-Finished Metal

By Dr. S. Wernick

The general advantage, cost reduction and value to industry accruing from the use of Pre-Finished Metal are indicated. Problems involved in using such material, arising from the nature and properties of the coating, are discussed. Stress is laid on the fact that pre-finished metal represents a challenge to the Industry which can only be met by improvement in the quality of metal finishes.

Experimental Studies of the Electrodeposition of Metals in Narrow Crevices

By Lucille B. Garmon and Dr. Henry Leidheiser, Jr.

This paper represents the first progress report of AES Research Project #17. It describes and summarizes results of experiments to determine the important variables which influence the distribution of an electrodeposit on a micro scale.

Selected experimental results are reported on cobalt, copper, iron, nickel, silver, and zinc baths, and on tin-nickel alloy baths, although the majority of the experimental work has been with various nickel baths.

A Black Chromium Plating Process

By Dr. A. K. Graham

A black chromium plating process has been developed which may be operated over a relatively low current density range of about 150 to over 450 asf, at temperatures from 70 to 100 F, with cathode efficiencies from about 6 to 15%. Uniformly deep black deposits result. Coating thickness can be varied as desired and its wear resistance is 2.5 to 3 times that of bright nickel. The coating is readily wettable with either oil or water and may find application as a substitute for hard or porous chromium. For decorative applications, oil, wax or organic supplemental coatings may be applied to improve the luster. The protective value of the coating may be varied with or without supplemental coatings. The coating may be applied to any basis metal that can be readily plated.

Leveling Power of Copper Sulfate Baths With Complexing Addition Agents

By E. Bertorelle, I. R. Bellobono, Carlo Bernasconi and A. Scarati

Leveling power in an acid copper electrolyte, consisting in a 0.5 Molar solution of $CuSO_4.5H_2O$ and 0.25 Molar solution of H_2SO_4, was examined, in the presence of organic addition agents, able to form complexes of different stability with cupric ions.

In most cases a field oriented growth was observed.

The leveling power was evaluated by means of a standard "pseudosinusoidal" microprofile, with an amplitude of 50 microns, performing several metallographic measurements after various electroplating times.

Plating Zinc on Steel from Pyrophosphate Solution-A Pilot Plant Investigation

By Dr. U. F. Marx and D. Povey

A pilot plant investigation of the electro-

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Myron B. Diggin

Dr. Walter R. Meyer

Dr. R. B. Saltonstall

deposition of zinc on steel from zinc pyrophosphate solution is described. The optimum operating conditions and the effects of departing from them are reported. Data for electrode polarization, throwing power, hardness, structure and corrosion resistance of the deposits are recorded and compared with those for a zinc cyanide solution. Finally, it is stated that while no firm conclusion can be reached about the relative operating costs of pyrophosphate and cyanide solutions, it appears that when all factors, including effluent disposal, are taken into consideration, the comparison will favor the pyrophosphate solution.

Electrodeposition of Nickel Alloys from the Phosphate Bath

By Dr. T. L. Rama Char

A detailed study has been made of the effect of variables on cathode efficiency, cathode potential, and composition of alloy deposits of nickel with tin, copper, zinc, cobalt and iron from the complex pyrophosphate bath. A wide range of alloy composition is possible. In the nickel-zinc system sudden changes occur in plate composition and cathode potential at low current density. At higher current densities the deposit composition was practically constant except with nickel-copper. Preliminary work has indicated possibilities of depositing alloys of nickel with manganese, tungsten, and molybdenum from this bath.

Chemical Conversion Coatings

By Robert F. Ayres

Various types of chemical conversion coatings, including oxides, phosphates and chromates, are defined, described and compared, and the distinction between deposits on the surface and conversion of the surface is illustrated. Experiments are reported relative to oxide components and co-precipitants in phosphate coatings, as well as the formation of stable chromium conversion coatings, and explanatory theories are discussed.

The Metal Surface Conversion Coating as a Paint Base

By Dr. Robert C. Gibson

The value of phosphate, chromate and oxide coatings, singly or mixed as bases for organic coatings on steel, zinc and aluminum surfaces is widely recognized. This paper discusses the manner in which these coatings perform their intended function and the preparation of the basis metals, and theory of the mechanism of formation of phosphate coatings. Importance of processing details with respect to performance of the coatings is also emphasized. A treatment which forms an amorphous oxide-chromate type of coating on aluminum and its alloys makes the surface receptive to paints.

The Accelerated Weathering of Organic Finishes

By A. A. B. Harvey

Accelerated weathering cycles consist of exposure to light, heat, moisture, and corrosive vapors, separately and in combination. Three systems of irradiation with subsidiary chemical treatments are compared and the degree of correlation claimed with natural weathering assessed. The necessity for careful interpretation of results against a wide background of natural exposures, and the dangers of making life prognostications are emphasized. The safe limit of acceleration seems to be of the order of twenty times.

Surface Texture — Its Influence on Organic Finishing

By Dr. W. Stein and D. H. Lloyd

In automobile and appliance industries where nearly half the organic finishing material is used on decorative surfaces to improve the surface texture of the metal, rejects for surface irregularities may be attributed either to a bad metal surface, or to the failure of the organic finisher to level it. Lack of "balance" between sections of the plant is the principal factor in heavy surface reject rates. Surface irregularities are divided into three amplitude groups and the probable trend of the future development is discussed. The importance of close cooperation between plant designers, paint technologists, and production engineers is emphasized.

The Influence of the Physical Metallurgy and Mechanical Processing of the Basis Metal on Electroplating—Ferrous Metal Conditions Affecting the Durability of Watts Nickel Deposits

By Dr. M. H. Jones, Dr. Chih-Yeu Lu, Dr. A. F. Mohrnheim and J. Zajdowski

As part of the work of A.E.S. Research Project No. 14, a study has been made of a number of the factors associated with ferrous bases that may influence the performance of Watts nickel deposits. These include the metallurgical history, the non-metallic inclusion contents, the surface condition resulting from different types of mechanical polishing and the deformation caused by stretching. The relative importance of various conditions and treatments on durability towards accelerated corrosion tests have been evaluated in statistically designed experiments.

The Nature of Mechanically Polished Surfaces

By L. E. Samuels, *Australia*

It is usually assumed that mechanical polishing of metal occurs by a mechanism of surface flow. Evidence is reviewed which indicates that flow either by a mechanism of the type proposed by Beilby or by one of gross plastic deformation does not occur in normal practice. Polishing appears to occur primarily by a cutting mechanism. A deformed layer is produced on the surface due to the cutting. Its nature and its possible influence on covering electrodeposits are discussed.

Outdoor Corrosion Results with Chromium-Nickel-Chromium Plate

By Dr. H. Brown and M. Weinberg

The excellent protection obtained in two and three years of outdoor exposure in an industrial atmosphere for the plating sequences of Cr-Ni-Cr plate, Cu-Cr-Ni-Cr plate, and Ni-Cr-Ni-Cr plate on steel and zinc die-cast are detailed, together with the plating procedures used. These results are compared with Cu-Ni-Cr and Ni-Cr plate of various thicknesses. The types of corrosion pits encountered with all these composite coatings are illustrated and compared. The systems with the final sequence of Cr-Ni-Cr, in which the high temperature type of chromium plate, about 0.05 mil, was used underneath the nickel plate, demonstrated outstanding protection against corrosion.

Improved Corrosion Resistance for Electroplated Die Castings

By Dr. Charles L. Faust, Hugh R. Miller and William H. Safranek

A research program sponsored by the American Zinc Institute included a study of many procedures for improving the corrosion resistance of electroplated die castings. Several plating systems showed good corrosion performance in outdoor weathering and accelerated corrosion studies on more than 500 panels and parts. The procedures deemed most practical for commercial production and which are capable of furnishing excellent corrosion protection include: (1) copper, duplex nickel and chromium, and (2) copper, bright nickel, and bright, crackfree chromium. Both systems are practiced commercially. The information in this paper justifies an expansion in production facilities for plating duplex nickel and bright, crackfree chromium, with the objective of improving the performance of die cast automotive hardware.

Corrosion Testing of Electrodeposited Coatings

By F. L. LaQue

Corrosion testing is vital to the success of plating. Tests are needed for three principal purposes:

1. To observe the performance of coatings under natural conditions of exposure properly related to actual use.

2. To observe the performance of coatings under conditions that will permit proper appraisal of quality in a time short enough

to be useful for inspection and to be helpful in expediting research leading to improved quality.

3. As a tool of research having advantages beyond reduction of the time required to secure useful results.

This paper discusses the basic requirements and possible limitations of tests being used or proposed for the purposes mentioned. Appropriate data are included to support the points discussed.

Experience with the Use of the Corrodkote Test

By D. M. Bigge

The Corrodkote Test has proved to be valuable both as a product acceptance test as well as a dependable means of evaluating research on electroplated copper, nickel and chromium coatings. Rather excellent correlation has been established between service exposure and Corrodkote Test results. Pertinent information is illustrated by means of photographs and charts.

Sulfur Dioxide Accelerated Corrosion Test — Testing Conditions and Equipment

By Dr. J. Edwards

The effect of varying the temperature of the test atmosphere has been investigated; the results indicate that the cabinet in which sulfur dioxide accelerated corrosion tests are made should be thermostatically controlled. Full details are given of the design of a suitable cabinet which will enable temperature, relative humidity and sulfur dioxide concentration to be kept within the recommended limits. A brief discussion is included of the scope and application of this form of accelerated corrosion test.

The Copper Chloride Modification of the Acetic Acid Salt Spray Test (Cass Test)

By C. F. Nixon

Following a brief discussion of the development of the CASS Test and of the presently recommended operating procedure, data and illustrations are presented to support the view that correlation between test results and out-of-door performance is good enough to make the test useful for both acceptance testing and for evaluating development effort to improve the durability of decorative plating and other finishes. Progress towards better understanding of what happens in the test chamber is reported, the object of this continued work being to further improve correlation of test results between laboratories and to achieve practical reliability in predicting out-of-door performance over several years of service.

Water Soluble Coatings for

By Robert A. Boller

Water-soluble resins can provide paint formulations and performance characteristics similar to conventional solvent-thinned alkyds, but eliminate the usual fire hazards associated with solvent systems.

These water-thinned vehicles exist as clear solutions and remain in one phase when diluted with water. Resins of this type offer the following features: simplicity of paint formulation, ease of pigment dispersion, film continuity, high pigment binding and gloss, mechanical stability and film conversion.

Spray application appears to be the most desirable method of coating.

Performance characteristics illustrated by photos, tables and graphs provide evidence that water-soluble resins can produce both primers and enamels for metal which compare favorably to quality solvent-thinned coatings in use today.

Epon Resin Coatings for the Electroplating Industry

By H. W. Howard

Their superior adhesion, flexibility, toughness and resistance to chemical attack and elevated temperature make the Epon resin coatings of special interest in the electroplating industry. Uses suggested are: clear films over decorative finishes such as silver, brass, bronze, etc.; stop-off coatings; protection of equipment and facilities in the plating room; lining plating tanks, and coating racks.

Resistance to chemical attack is so high that a stop-off coating applied before plating may, in some instances, be left on as part of the final finish.

Vinyl Diversions: Their Use in Metal Finishing

By M. Perez

The use of vinyl dispersions as coatings for metals is discussed, together with basis application techniques and equipment. Principal chemical and physical properties and methods of obtaining them by careful formulation are described. Recently vinyl dispersions, usually spray-applied as smooth, textured or "spattered" coatings have progressed into the decorative area. Some of the newer dispersions, at present either in limited use, or still in the development stage, are presented together with suggested fields of usage.

The Effect of Flow Rate and Current Density on the Electrolytic Removal Rate of Iron and Copper from a Watts Nickel Solution

By Dr. A. M. Max and M. L. Whitehurst

Avoiding the complicating factor of cathode surface roughening, the electrolytic removal of copper from a Watts nickel solution is shown to follow a logarithmic decay curve. The removal rate coefficient increases with bath current density and flow rate over ranges of ½ to 16 amperes per square foot, and six to fifty feet per minute respectively.

Iron removal is complicated by two separate factors, the effects of which are described.

Chromium in Cyanide Solutions and Its Removal

By Dr. E. Laue

The effects of chromate impurities in cyanide copper plating solutions, and several unsuccessful or undesirable removal processes are discussed. A new method for reducing hexavalent chromium and precipitating the resultant trivalent chromium with alizarin, is described. The method may be applied to other alkaline plating solutions, and a number of precipitating agents of the hydroxy anthraquinone type may be used. A simple practical procedure to detect chromium in cyanide copper solutions and to test the effectiveness of the method is illustrated.

The Effect of Shot-Peening and of Grinding on the Fatigue Strength of Chromium Plated High Strength Steel

By C. Williams and Dr. R. A. F. Hammond

The effect of shot-peening prior to chromium plating in the fatigue strength of two steels of 180,000 psi and 224,000 psi tensile strength respectively (and of surface rolling with the weaker steel) has been determined by rotating-bend tests.

Various intensities of peening and of rolling have been studied, and the fatigue strengths of the plated steels were shown to increase progressively with the intensity of the surface treatment, ultimately attaining the unplated values.

The increase in surface roughness resulting from peening at various intensities was measured for both steels and the effect on the fatigue limit of grinding, before or after chromium plating, to restore a good machine finish was then determined. The effect of baking at various stages was also investigated.

Some Aspects of the Corrosion of Decorative Plated Coatings

By Dr. F. A. Lowenheim and W. H. Rowan

The vital importance of improved corrosion performance of decorative-protective plated coatings is emphasized and some current efforts toward this end are reviewed. The value of statistical design in testing is illustrated. Effects of increasing thickness of copper, nickel, and chromium coatings are described. Possible improvement from the use of other coatings, such as 10% tin-bronze as a substitute for copper under nickel, as well as tin-nickel alloy deposit, alone and in combination with other coatings is discussed.

European Bright Anodizing Practice

By A. W. Brace

The response to bright anodizing is dependent on the composition and metallurgical structure of the aluminum, and these factors

Dr. William Blum

are briefly discussed. Both chemical and electrochemical brightening techniques are discussed. The influence of anodizing and sealing conditions on resistance to atmospheric corrosion is described, and methods for testing anodic coatings are summarized.

Hydration of Anodic Oxide Films

By M. S. Hunter, P. F. Towner & D. L. Robinson

The mechanism of hydration of anodically formed aluminum oxide films during sealing in boiling water is discussed and the progress of hydration is demonstrated by electrical measurements and illustrated by electron micrographs. Sealing of commercial anodic coatings is considered in the light of evidence indicating that the usual practices employed do not result in complete filling of the pores in the coating. The effects of various factors in accelerating and retarding the rate of hydration are also discussed.

Anodizing Processes for the Production of Very Thick Alumina Films

By R. Segond, P. Lelong, and J. Herenguel

Numerous anodic oxidation processes have been developed for forming thick and hard alumina films on aluminum alloys. Most of these processes make use of electrolytes at very low temperature. Processes developed in France make possible the formation of thick hard films at or above temperatures normally used. The electrolytes are made from acid salts and organic acids.

Two of these solutions are described in detail; one a solution of sodium bisulfate and citric acid, and the other, a solution of oxalic and formic acids. These processes permit the formation of films several hundred microns thick (24 microns = 1 mil) at unusually high current densities.

Developments in the Surface Treatment of Aluminum — Processes and Materials

By Dr. Richard Lattey

Industry requirements for bright anodized aluminum have stimulated production of super-purity aluminum. This paper explains the necessity for anodic or chemical brightening prior to bright anodizing.

The theory of anodic and chemical brightening is discussed, and the role of passivating surface coatings and films therein is indicated; anodizing is discussed in a similar manner. Specific processes for brightening and anodizing are discussed in some detail, as well as control methods. Mention is made of a new commercial aluminum alloy which is competing favorably with super-purity in many applications.

Electrochemical Techniques in Modern Metallography

By Dr. P. A. Jacquet

The value of metallography in modern metallurgy is widely recognized. The importance of electrochemistry in the transition of metallography from an art to a science, and in the x-ray and electronic examination of metal surfaces is discussed. A new advance, combining non-destructive "plug electropolishing" and an improved replica procedure is described. Electrolytic methods are reviewed, and techniques described for preparing surfaces for microscopic examination or for making replicas for optical and electronic micrographs. A number of photomicrographs, including a few showing copper, nickel, and chromium coatings, illustrate results obtained with the techniques described.

The Present State of Electrolytic Polishing in Europe

By R. Mondon

Electrolytic polishing, born in the laboratory about 30 years ago for the examination of metallographic specimens, has progressed steadily in this field, and has been helpful in studying the influence of surface distortion caused by machining and usual finishing methods on fundamental properties, such as friction and wear and resistance to fatigue and certain types of corrosion. The use of electrolytic polishing in the decorative field in Europe has been retarded by unavailability of suitable basis metals. Its widest industrial uses are non-decorative, such as deburring, improving corrosion resistance and smoothening metal surfaces.

The Ford Rotunda, at the gateway of the mighty Rouge Plant.

Electroless Copper Plating

By Dr. Edward B. Saubestre

The process of electroless copper plating is discussed with particular reference to coating of plastics in the manufacture of printed circuits. The development work described may be subdivided into the following steps: (1) selection of a sensitizer, (2) selection of a reducing agent, and (3) selection of a copper solution. Discussion is also made of formulas suitable for depositing thin copper mirrors and for depositing 1-2 mil. copper coatings.

Some Chemical Polishing Processes — Their Mechanism and Their Application

By Dr. R. Spehn

In the chemical polishing of copper and its zinc- and zinc-nickel-alloys, the dissolution rate is controlled by the kinetics of the formation of nitrous acid in the viscous layer surrounding the metal. The role of nitrous acid is discussed using data of electrochemical measurements, viscosity, and water activity in the viscous layer. The mechanism of polishing zinc, aluminum and nickel is illustrated.

Properties of chemically polished surfaces are discussed and compared with surfaces produced by electrolytic polishing.

A short survey of control methods for chemical polishing solutions is given, and some commercial processes tabulated.

The Veteran's Memorial, completed in 1950, is the first building in the beautiful new Civic Center which is taking shape along Detroit's riverfront.

Influence of Various Surface Treatments on the Resistance to Fatigue of Two High Strength Aluminum Alloys

By G. Abadie and G. Vidal

The two alloys studied are normally used in the production of large aircraft landing gear forgings. The surface treatments studied were: chemical milling, electropolishing, anodizing, acid etching, and a proprietary chromate treatment. The fatigue tests were made by means of Schenk fatigue machines of the "Webi" type with 10^4 and 10^6 alternations at rupture.

The Effect of Metal Preparation on the Performance of Water Thinned Coatings

By Ralph A. Williams

For this investigation, four different proprietary water thinned vehicles, two of the water soluble vehicle type, and two of the emulsion type, were used. A petroleum solvent thinned primer was included as a control. Humidity, salt spray and water immersion resistance as well as film hardness, gloss, and flexibility were investigated. Seven different types of metal treatment were performed on steel panels prior to coating and their effects tabulated. All tests were carried out in quadruplicate.

Vinyls in Modern Industrial Coatings

By W. H. McKnight

The principal types of vinyl materials discussed are vinyl solution coatings, organosols, and plastisols, all of which are normally baked. Typical molecular structures, methods of manufacture, physical and chemical properties are discussed. Because adhesion is an important formulating problem, primers have received considerable attention. Formulating principles are discussed in detail. New applications for organosols and plastisols are appearing frequently, and a brief forecast of expected striking developments is presented.

Protecting Silver and Copper Against Tarnishing by Means of a Chromate Passivating Process

By J. L. Melse and Dr. P. Baeyens, *Holland*

The paper describes the experimental work on which are based improvements in the method of obtaining protection of silver or copper by immersion in solutions of hexavalent chromium compounds. To obtain good passivation consistently, without interfering appreciably with the solderability of either silver or copper, certain metal-complexing agents are added to the hexavalent chromium solution so as to maintain a defined relationship between the pH value of the solution and the metal solution potential.

Chromic Acid Anodizing Characteristics of Wrought Aluminum Alloys

By George E. Best, J. G. Heckers, Jr., John W. McGraw and R. V. VandenBerg

Experimental preparation of chromic acid anodized coatings has been carried out with the following wrought aluminum alloys: 1100, 2024, 3003, 5052, 5056, 6061, 7075, Alclad 2014, and Alclad 7075. Operating variables of voltage, time, bath pH and temperature were explored above and below the chosen standard of 40 volts-30 minutes-pH 0.5-95F. Measurements were made of current density, coating weight, coating thickness, dielectric strength, and salt spray resistance, with calculations of coating weight per ampere-minute, electrical and coating efficiencies.

Barrel Plating with Special Consideration to Protection of Thread Diameters

By A. W. Wallbank

The importance of batch size in selection of barrel plating equipment and rival methods of constant weight and constant area in barrel loading are discussed as well as equipment and solutions for barrel chromium plating. The effect of deposit variation in the load is discussed and reasons given for the adoption of Batch Average as the criterion of quality.

A method for calculation of probability of interference with various deposits and thread diameters is derived and explained. Methods are suggested for protecting thread diameters when the standard allowance is insufficient for the required deposit.

The new City-County Building, which forms a part of the downtown redevelopment.

Ductility in Plated Coatings

By Dr. Harold J. Read and Thomas J. Whalen

Ductility of plated coatings is of importance as a factor in corrosion, and in forming pre-plated strip. Because plated coatings are thin, useful data can be obtained only in a test which is convenient and useful for specimens which would usually be described as brittle foils. The Jovignot hydraulic bulge test has been adapted to this problem, and data agree well with those obtained with the traditional tensile test, which is difficult to use on brittle foils. New convenient self-contained rapid equipment is described which can be operated by unskilled personnel.

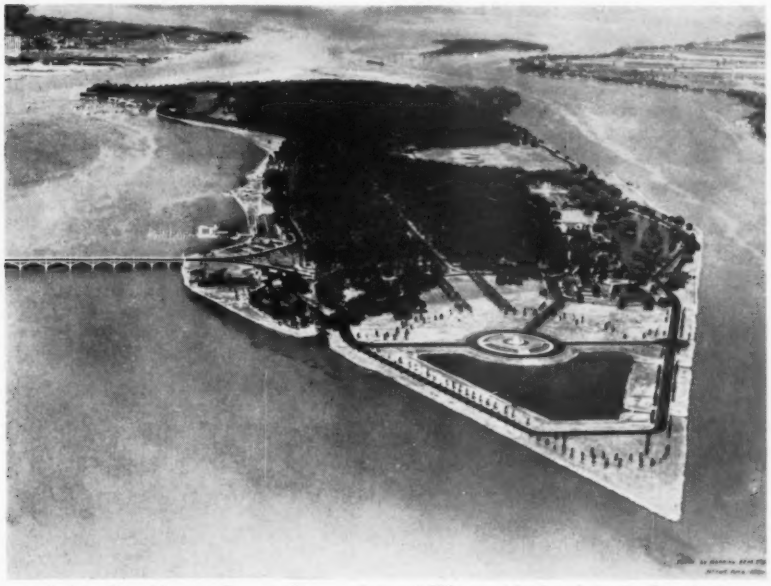
"Significant strain" is explained and the method of obtaining strain data from the hydraulic bulge test is described. Effects of bath composition and plating conditions on the ductility of some plated coatings are shown.

Electrodeposits as Resists in Selective Heat Treating

By R. Scott Modjeska and S. P. Gary

Mild steel (SAE-1010) rods, partially masked, plated with copper, tin-bronze, tin, silver and nickel are carburized or nitrided. Efficiencies as resists are compared. Micro studies of the electrodeposits before and after heat treating are compared in an attempt to learn mechanism of resist.

Included are formulae and operating conditions for plating baths employed and data on heat treating conditions.



Belle Isle, Detroit's most famous playground, is a 1,000 acre island park in the Detroit river.

M.F.S.A. Program

AS the opening of the Industrial Finishing Exposition and Golden Jubilee AES Convention approaches, interest and membership is at an all-time high in the Metal Finishing Suppliers' Association, spokesman for those selling to this field. Most of the record 134 exhibitors are corporate members of the Association, and the current officers of the MFSA will be active on the exhibit floor at their firms' booths. Earle W. Couch, president of the Lea Manufacturing Company, Waterbury, Conn., is president of the Association. Arrangements in Detroit were handled by liaison officer Dee F. Mosher, who is also associated with Lea-Michigan, Inc. Both of their firms are exhibitors.

Membership in the group is open to all firms selling to this industry, which includes not only manufacturers of equipment and supplies, but distributors, jobbers, and others. Dues structure is based on a national, regional and local basis, with decision as to degree of participation up to the member. Naturally, firms selling on a national basis are expected to affiliate in that classification. Each member firm has one vote and it may designate an individual to represent it and cast its vote. Each new member receives a framed certificate of membership and is entitled to use the MFSA insignia on letterheads and other advertising. For complete information on membership, write to A. P. Munning, Executive Secretary, c/o Munning & Munning, Inc., 202 Emmet Street, Newark 5, N. J.

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Raymond F. Ledford
1st Vice-Pres.

At the Detroit meeting a proposed market study will come up for discussion and final action. A national marketing research organization will be engaged to survey the market for materials and equipment consumed in this field. Market information of this kind has up to now been more or less nonexistent. The factual data collected will be available to the members of the MFSA.

At the Convention and Exposition the MFSA will, of course, continue its long-standing custom of improving the climate of doing business in the finishing field through its sponsorship of social events. These will include the annual luncheon open to all representatives of supply houses in attendance, the "Open House" party, and a golf tournament under the direction of R. M. Burford. Joint cocktail parties have been sponsored in various localities around the country to precede AES banquets. These have resulted in more enjoyable affairs for the guests, and economies for the hosts.

Condensed MFSA Program

All events except the golf tournament at the Sheraton Cadillac.

Monday, June 15

9:00 a.m.—
Board of Trustees Meeting
12:00 noon—*Crystal Ballroom*
Luncheon and Annual Meeting
8:00 p.m.—*Crystal, Grand and Founders Ballrooms*
"Open House" Party
8:00 p.m.—buffet supper
9:00 p.m.—dancing
Crystal, Grand and Founders Ballrooms

Wednesday, June 17

8:30 a.m.-12:00 noon—
Golf Tournament, Pine Lake Country Club, Pontiac, Mich. Green fees $5.00. Prizes.

F. P. Green
2nd Vice-Pres.

J. G. Carrique
3rd Vice-Pres.

Ezra A. Blount
Treasurer

M. M. Beckwith
Past President

A. P. Munning
Exec. Secretary

L. A. Davies
Trustee

S. M. Goble
Trustee

C. C. Helmle
Trustee

A. B. Hoefer
Trustee

H. D. McLeese
Trustee

R. M. Norton
Trustee

R. M. Burford
Golf Chairman

Exhibitors

Following is a complete listing of exhibitors of equipment and supplies, together with the booth numbers and the names of persons who will be in attendance at the booths during the Industrial Finishing Exposition.

Abbey Process Automation, Inc. 316-326
37-01 48th Avenue, Long Island City 1, New York.
Harold G. Abbey, President.
Unit consisting of two typical stations from an Abbey-Matic plating system with carriers in motion.
Refer to page 69.

Abrado Finish Corp. 34
1750 Elizabeth N.W., Grand Rapids 4, Mich.
Wallace L. Reed, Pres.; C. Heamon Castle, Exec. Vice-Pres. and Technical Director; Clare A. Vander Sloot, Sales Engineer; Paul W. Sheppard, Factory Representative.
New Model B312 Abrado Twin barrel finishing machine in operation. Abrado compounds, media and miscellaneous equipment. An assortment of unprocessed and processed parts showing these parts as produced and after barrel finishing.
Refer to page 144.

Acme Manufacturing Co. .....270 & 272
1400 E. Nine Mile Rd., Ferndale, Mich.
Robert Wesler, William Lumsden, Harold Lane and Kenneth Johnson, all sales engineers.
A new compact Acme model KP flat stock grinding and polishing machine will be featured and three different models of Acme semi-automatic polishing and buffing machines, all in operation on a variety of die castings, stampings and moldings. In addition, busses will transport selected Exposition visitors to the Acme Mfg. plant for an open house showing all their machines. It has been arranged in connection with the 50th Anniversary of this firm.
Refer to page 17.

Manuel Ben
Exposition Vice-Chairman

Alchemize Corporation 276
Congress Expressway at 621 South Kolmar Ave., Chicago 24, Ill.
John F. Jumer, President; Cecil Fisher, Sales Mgr.; Gene Jablonski, Technical Service Mgr.; H. C. Karels, Sales Engineer.
Aluminum alloys chemically polished with Alchemize and chemically polished aluminum-silicon castings in "Luster Burr." Examples showing uses, sizes and shapes of the two processes.
Refer to page 141.

Allied Industrial Products, Inc. 62
620 No. Michigan Ave., Chicago 11, Ill.
Ajax bias buff.

Allied Research Products, Inc. 176 thru 179
4004 E. Monument St., Baltimore, Maryland.
H. C. Irvin, Pres.; J. A. Cairns, V.-P. Sales; F. M. Mansfield, V.-P. Marketing; B. Leonelli, Works Mgr.; L. J. Camill, A. L. Poe, L. F. Richard, all District Sales Managers; O. H. Tiedeman, Equip. Sales Mgr.; R. Clement, Equip. Engr.; D. J. Borodin, Chief Engr.; J. Pollack, Rectifier Engr.; J. Horner, Product Director; R. E. Marce, T. Smolinski, R. S. Sweeney, H. Van Buren, all Sales Engineers.
A combination of product description and demonstration of results of applying the company's line of Iridite Chromate Conversion Coatings and Irilac Clear Protective Coatings. The Wagner line of rectifiers will be demonstrated and a Wagner Auto-Loader will automatically change panels bearing product descriptions and sample parts. Complete process engineered installations will be illustrated.
Refer to pages 16, 35.

American Air Filter Co., Inc. 129 and 130
215 Central Avenue, Louisville, Kentucky.
J. G. Liskow, Sales Mgr.; J. S. Munson, Supervising Engr.; H. E. Soderberg; R. R. Moore, Asst. Adv. Mgr.; E. W. Graham, Terr. Repr.; F. J. Fischer, Sales Engr.; Ivan Dyer.
Equipment for the collection of dust and fumes.

American Buff Company .....1 thru 6
2414 S. LaSalle Street, Chicago, Illinois.
Ben P. Sax, Chairman of the Board; Stan Sax, Vice-Pres. in charge of Marketing; Art Murakami, Murray Paley, Morrie Tychman, Jim Bacha, Ed Hoyle, Jim Belanger, Harry Pink, Chuck Wise, Tom Wiggins, Ralph Preuss, Harry Parsons, Marv Radom, Bob Hulland, all salesmen.
New types of buffing wheels, buffing procedures, table motors, belts. Display will include an actual simulated machine-shop in which visitors will be allowed to operate buffing machinery, and polish, buff, etc., themselves, with guidance from company representatives. Automatic buffing equipment and procedures will be shown and explained.
Refer to page 7.

American Metal Climax 230
21 E. 26th St., New York 10, N. Y.
Warren Schultz
OFHC Copper Anodes, related items.
Refer to page 9.

American Optical Co. 296
Instrument Division, Eggert & Sugar Rds., Buffalo 15, N. Y.
Miss M. L. Cook
Recording Electro-Polarizer.

American Smelting & Refining Co. 315-318
Federated Metals Div., 120 Broadway, New York 5, N. Y.
S. M. Goble, Federated-Electro Chemicals Dept. Sales Mgr.; G. Spotts, Asst. Sales Mgr.; J. Vogelos, Field Engr.; Perry, Heemstra, Sole, Ebersole, Reilly, Ryan—all Field Representatives.
Plating Anodes; Federated Plating Addition Agents (featuring a new bright nickel process — Levelmax); Electro Chemicals; Demonstration of bright nickel plating by the Federated Metals Division of Asarco. See also Enthone Inc. listing.
Refer to page 47.

Automotive Rubber Co., Inc. 281 thru 284
12550 Beech Road, Detroit 39, Mich.
W. J. Beringer, Vice-Pres. Sales; R. D. Bailey, Vice Pres. Operations; P. V. Millard, Sales; A. C. Johnson, Sales; M. F. Brown, Sales; M. Richardson, Est.; R. A. Jackson, Vice-Pres.; R. Calaceto, Mgr. of New York; G. Moons, Est.; and R. L. Redmond, Exec. Vice-Pres. and General Sales Mgr.
Air pollution abatement systems. Three types each with pilot plant. Namely, acid air wash, cyclonic jet scrubber and jet impactor scrubber. Acid Buggy for all corrosive liquids. Elastomeric Linings for all process industries. Molded Plating Racks. Do-it-yourself assemblies. Metal Fabrications.

The Baird Machine Company 211
1700 Stratford Avenue, Stratford, Conn.
Charles Bennett, Sales Representative; Walter Rose, Sales Promotional Mgr.
New Baird 30 x 46 horizontal barrel.

L. G. Belanger
Exposition Space Sales Mgr.

Finishing machine and Baird #2 Poliaction Tumbler with electrically heated barrel.

Beacon Supply Co. **49**
110 Marginal St., Chelsea 50, Mass.
Max Feinberg, Albert Farnham, Larry Glissman, John P. Nix, Louis A. Tanner, Marvin A. Starensier, Philip Schell, John A. Turk, Vince Morris, Thomas V. Keating.
All types of buffing wheels and buffing compounds. And, the Atlantic Greaseless Satin Finishing Compound manufactured by the Atlantic Compound Co. and distributed by the Beacon Supply Co.

Belke Manufacturing Co. .....**147 & 148**
947 N. Cicero Ave., Chicago, Ill.
Wm. E. Belke, Ralph E. Belke, F. H. Marshall, Ed Stanek, R. W. Kotz, Carl Hansen, Henry O'Reilly.
Racks, rectifiers, plating barrels, conveyorized automatic rack plating equipment, automatic barrel equipment, corrosion proof equipment for plating.
Refer to pages 41, 135.

Bias Buff & Wheel Div. **112**
Riegel Textile Corp., Conover, N. C.
W. Webster, Jr.
Buffs and related materials.
Refer to page 728.

Bison Corporation .....**245 & 246**
1935 Allen Ave S.E., Canton 1, Ohio
N. Knute Morelli, President; W. K. Henry, Vice-Pres.; Gene Huth, General Mgr.; Ralph Coy, District Representative; Matt Hackman, District Representative.
Buffing and polishing wheels, metal finishing chemicals and addition agents.
Refer to page 141.

G. S. Blakeslee & Co. .....**180 thru 182**
1844 S. Laramie Ave., Chicago 50, Ill.
A. L. Bashe, Sales Mgr.; Chris Harrs, Sales Rep.; W. C. Thiess, A. L. Wudi, L. E. Miller, R. R. Merrill, R. B. Thompson, all sales representatives.
Ultrasonic Conveyorized Degreaser; Combination Degreasing and Painting Unit.

Branson Ultrasonic Corp. .....**31 & 32**
21 Brown House Road, Stamford, Conn.
N. G. Branson, President; H. F. Osterman, Sales Mgr.; G. B. Hollireth, Applications Engineer; M. C. Tamas, Sales Engineer; R. Hoxie, Sales Engr.; R. Jacobs, Sales Engineer.
Ultrasonic cleaning equipment ranging from bench-top units to a large system designed for cleaning items on plating racks. All units will be in operation.
Refer to page 126

Bruce Products Corporation
155 and 156
500 North West Street, Howell, Mich.
M. F. Macaulay, Pres. & General Mgr.; C. I. Renwick, Vice Pres.; R. E. Bryar, Comptroller & Asst. Secty. & Treas.; S. H. Bruce, Gen'l Sales Mgr.; E. M. Murley and G. P. Hogg, Factory Sales Engineers.
Company products and raw materials including a listing of Bruko Products.

The Buckingham Products Company .....**41 and 42**
14100 Fullerton Ave., Detroit 27, Michigan.
R. M. Buckingham, Pres.; H. J. Patterson, F. X. Woods, H. E. Gray, H. P. Halladay, R. O. Blackford, Joe Davis.
Various types of polishing and buffing compositions.

The Carborundum Company
161 and 162
Electro Minerals Division, Niagara Falls, N. Y.
G. R. Rayner, Jr.; D. N. Rodger; N. L. Watkins; R. W. Fitch; R. A. Murphy; E. J. Schultz.
Demonstration-type booth and display emphasizing barrel finishing techniques. This will include tumbling barrels, media and compounds. Actual parts will be tumbled at the show to demonstrate the different types of products and materials adaptable to tumbling.

Carmac Chemical Co. **19**
1015 Peralta St., Pittsburgh 12, Pa.
Chemicals for finishing industry.

Carpart Corporation **11**
209 W. Exchange, Owosso, Michigan.
Charles I. Kramer, General Sales Mgr.; John Welch, Plant Mgr.; John R. Des Jardins, Sales.
A fiberglas tank, Boltaron 6200 unplasticized polyvinyl chloride duct work and three types of fume collectors manufactured from solid plastic; also a demonstration of proper welding technique of forming PVC sheets.

Casalbi Company **17**
540 Wayne St., Jackson, Mich.
Wm. B. Sparks, Vice-Pres.; Carter W. Sparks, Vice-Pres.; Bud Cowles, Sample Processing.
Barrel finishing equipment with one unit under power and samples of customers parts which are barrel finished (before and after). Samples of various tumbling media.

The Chemical Corporation **50**
Waltham Ave., Springfield, Mass.
B. H. Gardner, Exec. Vice-Pres.; W. B. Jones, Laboratory Director; H. L. Mitchell, Technical Director; J. H. Gorman, ENC Sales Rep. (Cleveland); J. H. Sauntry, Midwest Sales Rep. (Chicago); Leo Arsenault, Eastern Sales Rep. (Boston).
Operating demonstration cycle for producing colored chromatic conversion coatings on zinc parts with Luster-On-Color Process. Also in operation a Winscott "In-Tank" filter especially adapted for precious metal or nickel plating use.
Refer to page 28.

Circo Equipment Company ..**120 & 121**
51 Terminal Ave., Clark, N. J.
Melville Morris, Pres.; Benson Carlin, Exec. Vice-Pres. and Sales Mgr.; Wellington Vandeveer, Vice-Pres.; Severn Carlson, Sales Mgr.; R. B. Hiley, Vice-Pres., Automotive Div.; James Mastrian, Chief Engineer; Robert Monahan, Sales Engineer; W. H. Webb, Sales Engr.; Ray McDaniel, Sales Engr.; Ray Ledford, Sales Engr.
Vapor Degreasers — Agitating Washers — Ultrasonic Cleaners — all in operation.
Refer to page 108.

Clementina Ltd. **117**
2277 Jerrold Ave., San Francisco, Calif.
Bob Strickland, Midwest District Manager, K. F. Keefe, Sales Manager.
Complete line of Blast Cleaning equipment including Wet Hone machine and dry blast cabinets.

Cleveland Process Corporation ..**206-209**
1967 E. 57th St., Cleveland 3, Ohio.
E. D. Sutton, Sales Manager; E. F. Layton, R. M. Fred, Mark McGinnis, all in Sales Department; H. L. Walter, Purchasing Agent.
Electric Immersion Heaters and Quartz Ovens and sections.
Refer to page 109.

Clifford-Rockwell Co. .....**212 & 213**
19364 James Couzens Hwy., Detroit 35, Mich.
Dean Rockwell, Norman Hill, Clinton Brisendine.
Hermes coated abrasives. All types of coated abrasives in belts, sheets, rolls and discs. Made in Germany. Newark Brush Co.—Power brushes in wire and tampico. All types of industrial brushes. Composition Materials Co., Inc. Organic abrasives—crushed black walnut shells, corncobs, high grade wood flour, leather fibers, etc., for blasting, tumbling, burnishing and drying.

F. L. & J. C. Codman Co. **20**
Rockland, Mass.
Buffing and polishing wheels.
Refer to page 71.

Conversion Chemical Corporation **128**
98 East Main Street, Rockville, Conn.
K. P. Bellinger, Pres.; Gene Chapdelaine, Vice-Pres.
Brighteners, Bright Dips and Chromate Coatings and specialties for cleaning, drying and corrosion protection, including Kenvert-O-Color, colored metal samples, and various chromate films on zinc, cadmium, zinc die castings, brass, copper and silver.
Refer to page 120.

Corning Glass Works **74**
Corning, N. Y.
Heat exchangers, industrial radiant heat.

Cowles Chemical Company **37**
7016 Euclid Avenue, Cleveland 3, Ohio.
George Wolenben, Haner Welch, Richard Connors, Clay Sayers—sales representatives; William Robinson, Research Engr.; Elmer Lord, District Sales Mgr.; William Swift, Assistant Sales Mgr.
Cleaners used in the electroplating trade, including soak cleaners, electro-cleaners, spray cleaners, acid and alkali types.

Davies Supply & Mfg. Co. **249**
4160 Meramec St., St. Louis 16, Mo.
L. A. Davies, Pres.; E. F. Conroy, Jr., Exec. V.-P.; A. S. Burnett, V.-P.; B. F. Walraven, Sales Engineer; A. P. Wrisberg, Sales Engineer.
Plating and anodizing racks and fixtures; Davynol coated vessels, duct work, etc.; Rod insulators; transfer pump.
Refer to page 55.

Dean Thermo-Panel Coil Division, Dean Products, Inc. **151-154**
616 Franklin Avenue, Brooklyn 38, N. Y.
Walter Raskin, President; Rubin Raskin.
Visitors will be shown the how and why of the new Dean fittings and the heavier gage panels now available for assuring longer life — for combating corrosion — for higher efficiency.
The Dean Thermo-Panel Coil as applied to tanks, vessels, vats, reactors, mixers, drum warmers, valve warmers, etc. Methods will be demonstrated.

Deering Milliken Co., Inc. ....**12 and 13**
1045 Sixth Ave., New York 18, N. Y.
E. R. Loomer, Jr., Merch. Mgr. Gainesville Mill including Buff Fabrics; W. F. Garth, Manager Gainesville Mill; Harry Stahel, Field Rep. Buff Fabrics.
Pictorial description of all phases of the manufacture of Buff Cloth — starting with areas of growth of raw cotton — a picture story follows — including research showing each step taken to produce Buff Cloth. A loom will be in operation weaving buffing cloth and samples will be available.
Refer to page 122.

Detrex Chemical Industries, Inc. **63 & 64**
14331 Woodrow Wilson, Detroit 32, Mich.
W. F. Newbery, V.P. in charge of sales; L. Camel, Sales Mgr.; Chemical Processing Div.; A. W. Stoddard, Director of Adv. & Public Relations; R. Stribley, Special Products Mgr.; R. Preston, National Accts. Mgr.; A. J. Hebsacker, Region Mgr.; W. F. Lucas, Region Mgr.; L. C. Manhardt, Region Mgr.; W. Ross, Chemist; M. Stapleton, Chemist.
New Detrex industrial cleaning and finishing chemicals including pre-soak cleaners, electrolytic cleaners for plating, di-phase emulsion cleaners, and phosphate coatings for paint-bonding and rustproofing.
Electrolytic cleaning and chrome plating on zinc die cast items will be in operation.

The Diversey Corporation ....**43 and 44**
1820 Roscoe St., Chicago 13, Illinois.
M. T. Bennett, Mgr., Metal Industries Dept.; J. H. Palmer, Ass't. Mgr., Metal Industrial Dept.; R. E. Pettit, Technical Consultant; W. H. Murphy, District Mgr.; C. G. Smith, District Mgr.; W. Laletin, District Mgr.; L. C. Hesoun, Sales Representative; J. W. Shrank, Sales Representative; C. R. Barkhurst, Sales Representative; W. B. Drake, Sales Representative.
Diversey's new DS-9 Bright Dip process for descaling and brightening 300 series stainless steel. Also an anodizing unit, showing color anodizing of aluminum, employing Diversey products for surface preparation.
Refer to pages 51-53.

The Dow Chemical Company **223 and 224**
Midland, Michigan.
From Saran Lined Pipe Co.—R. P. Marshall, Mich. Rep.: J. A. Kloustine, Asst. Sales Mgr.; J. W. Reed; Treas.; S. H. Blackmore, Pres.
Saran Lined pipes.
Refer to page 43.

Du-Lite Chemical Corp. **40**
Middletown, Conn.
K. J. Dooley.
Refer to page 127.

E. I. Du Pont De Nemours & Co., Inc. .....**148 and 149**
Electrochemicals Dept., Wilmington 98, Delaware.
From Wilmington: P. R. Lindsay, Manager Sodium Products Div.; R. S. Creadick, Sales Super. Sodium Prod. Div.; C. B. Shepherd, Mgr. Chlorine Prod. Div.; J. J. Hargmuten, Service Mgr., Chlorine Prod. Div. From Detroit: P. R. Hendrixson, Mgr. Elchern-Detroit Office; D. W. Hill, J. B. Hitchcock, Sodium Products Tech. Rep, Det. Office.
Plated parts and photomicrographs of new copper plating process. Description of new tri-chlorethylene based phosphatizing process.

Du-Tone Chemical Co., Inc. **124**
1208 Greenfield Ave., Waukegan, Ill.
John E. Hunt, Vice-Pres. in charge of Technical Service; Mrs. Bernice Hunt; James August, President in charge of sales; Mrs. Irma August.
Rest lounge showing a rectifier and literature on the Du-Tone plating process.

Eaton Chemical & Dyestuff Co. **45**
1490 Franklin St., Detroit 7, Mich.
Chemicals, anodes, anodizing dyes, plating chemicals.

Electro Glo Company **273**
625 S. Kolmar Ave., Chicago 24, Ill.
John F. Jumer, President; Cecil Fisher, Sales Manager; Gene Jablonski, Technical Service Mgr.; H. C. Karels, Sales Engineer.
Examples of Electropolished finishes on different kinds of metals, in various shapes and sizes, showing both decorative and industrial uses on aluminum alloys, copper alloys, steels and stainless steel.
Refer to page 137.

Electronic Rectifiers, Inc. **99**
2102 Spann Ave., Indianapolis 3, Ind.
Paul B. Freeman, Chief Engineer.
Silicon Rectifier Plating Power Supply-1500 ampere 2-9 volts DC, also silicon and magnesium copper sulphide rectifier replacements units for Udylite-Mallory plating rectifiers; also 1500 ampere 6 volts magnesium copper sulphide power supply without controls.

Enthone, Inc. **106-110**
442 Elm Street, New Haven 8, Conn.
Dr. Walter R. Meyer, Pres.; C. C. Helmle, Vice-Pres. & Gen'l Mgr.; Joseph Rhoads, Asst. to Gen'l Mgr.; W. K. Murray, Mgr. of Marketing; Dr. E. B. Saubestre, Technical Director; E. B. Washburn, Supv. Tech. Serv.. J. J. Martin, Manager of Equip. Dept.; H. McGuire, Asst. to Sales Mgr.; A. Harry Sanders, J. R. Eisele, J. H. Shockcor, D. S. Hartshorn, F. A. Schneiders, A. J. Kolb, L. V. Gagnon, H. M. Goldman, all Sales Engineers.
Enthone Enstrip Metal Strippers, Ebonol blackening compounds, Alka-Deox alkaline derusting compounds, paint strippers, processes for plating on aluminum, Enthol buffing compound removers and Entek tarnish and corrosion preventives.
Refer to page 3.

Erie Engine & Mfg. Co. Erie Degreaser Division **171 & 172**
953 East 12th Street, Erie, Pa.
J. A. Roos, President; Lloyd Adam, Vice-President; J. H. Bailey; J. W. Legler; Ray E. Weller, Chief Engr.; Art Albert.
The latest model Erie patented waterless vapor degreaser in operation.
Refer to page 72.

Federated Metals Div. of American Smelting & Refining Co. **111**
120 Broadway, New York 5, N. Y.
Anodes, brighteners, conversion coatings.
Refer to page 47.

Finish Engineering Co. ....**228 and 229**
1115 Cherry St., Erie, Penna.
R. B. Way, Pres.; Carl Hersey, Vice-Pres.; Clifford Scantlebury, Sales Manager; G. J. Gardner, Sales Engineer; Howard Miskill, Design Engineer.
Tools and machinery for automatic spray painting and detail decorating. Stainless Steel screens and adjustable fixtures for screening.

Formax Mfg. Co. .....**231 thru 234**
3171 Bellevue, Detroit 7, Mich.
Howard McAleer, Pres.; E. W. McAleer, Vice-Pres.; J. J. McAleer, Vice-Pres.; R. D. McAleer, Sales Engineer; S. W. Rodgers, Sales Mgr.; C. H. Rodger, Sales Engineer; Robert Blake, James Follas, L. Malone, N. McCune — all Sales Engineers; B. Jeske, Plant Mgr.; C. Fliger, Adv. Mgr.
Buffing compounds, buffing wheels, liquid spray compound applicators, abrasive polishing wheels.
Refer to page 134.

G. S. Equipment Co. .....**294 and 295**
G. S. Plastics Co.
15583 Brookpark Road, Cleveland 35, Ohio.
Thomas R. Gill, Pres.; G. S. Equip. Co.; W. A. Munkacsy, Pres., G. S. Plastics Co.; Albert Singleton, Pres., The Singleton Co.; C. H. Nefferger, Gen. Sales Mgr., all Cos.; Geo. Stevenson, Eastern Dist., Sales Mgr.
A complete line of barrel plating equipment including numerous new types of plating cylinders. Corrosion test cabinets. Plastisol and epoxy coated products with unique and unusual applications for same.
Refer to page 58.

General American Transportation Co. **252**
135 S. LaSalle St., Chicago 90, Ill.
W. J. Crehan.
Chemical Nickel Alloy plating on various items.

Glo-Quartz Electric Heater Co., Inc. .....**167 and 168**
1366 Erie Street, Willoughby, Ohio.
G. Hayden, Pres.; G. T. Stokes, Vice-Pres.; A. M. Dauber, Sales Engineer; D. Zulewski, Salesman; P. Baker, Factory Mgr.; R. J. Schaefer, Mgr. Los Angeles Branch.
Immersion Heaters, all types and models,

Copper, Mild Steel, 304 Stainless Steel, 316 Stainless Steel, Lead, Transparent Quartz, Translucent Quartz, Impervious Graphite, etc. Electric Immersion heater controls of combination thermostats and magnetic relays, time switches, liquid level controllers. Quartz infra red oven panels and quartz tube oven elements for use in dry off and paint baking applications.

Refer to page 117.

The Grav-i-Flo Corporation 143-146

400 Norwood Ave., Sturgis, Michigan

R. L. Davidson, President; L. R. Davidson, Vice-Pres.; Earle R. Bogema, Chief Engineer; Eugene Jarvis, Sales & Service Engineer; Maurice Condon, Sales and Service Engineer.

Spin-Finish mechanical finishing machine in operation finishing zinc base die castings. A Model BT32-30-2 tumbling machine and a two-deck mechanical chip and parts separator.

Great Lakes Carbon Corp. 113

333 No. Michigan Ave., Chicago 1, Ill.

Filter aid.

Hammond Machinery Builders, Inc. .....261 thru 266

1600 Douglas Ave., Kalamazoo, Michigan.

S. H. Miller, Sales Manager; R. M. Bell, Technical Manager; D. A. Kilb, District Representative; R. P. Ellis, Wm. Gleason, W. C. Johnson, all in Sales Department.

Horizontal Return Strait-line Automatic Polishing and Buffing Machine with heavy duty floating heads; J21-4 Rotary Indexing Turret for polishing, buffing and deburring; K46-6 Rotary Indexing Turret with Oscillating Abrasive Belt Head for polishing; Special Chain Drive Table for finishing contour work; Model 7-VRRO 2 spindle polishing and buffing lathe; Hammond Model FF-12-2 two-head Flat Finisher; Hammond DK-6 Cyclone Type Duskolector.

Refer to page 123.

Hanson-Van Winkle-Munning Co. 299 thru 314

100 Church St., Matawan, N. J.

James A. Badaluco, Vice-Pres. and Manager Compounds and Buff Sales; Charles E. Bagwell, Vice-Pres., Equipment Div.; E. C. Bosl, Field Electrochemist (Alert Supply Co.); Perry C. Burnham, Dist. Mgr., Grand Rapids; Myron B. Diggin, Vice-Pres. and Technical Director; Merrill Feldman, Project Engineer; Louis M. Hague, President; E. H. Hanlon, Sales Office Mgr.; W. J. Harper, Chief Eng., Equipment Division; G. M. Herring, Dist. Mgr., Eastern District; J. D. Kershaw, Dist. Mgr., Detroit; H. B. Koehler, Mgr. Electrical Sales; M. J. Moll, Mgr. Conveyor Sales; D. H. Morris, Field Electrochemist; R. M. Norton, Vice-Pres., Supply and Distribution; D. M. Roney, Sales Mgr., Equipment Div.; C. A. Solla, Dist. Mgr., Cleveland; Almo D. Squitero, Chief Chemist; W. S. Wilkinson, Exec. Vice-Pres. in charge of Operations; William J. Slattery, Jr., Advertising and Publicity Mgr.

A full scale, production size, full automatic conveyor will be in operation. Embodied in the conveyor will be many innovations designed to illustrate its versatility and ability to either anodize or electroplate. The unit features automatic and manual selective controls for a wide range of processing and plating treatment cycles. A Hanson-designed automatic rack loader and monorail chain conveyor will be operating in conjunction with the full automatic. In its rectifier display, H-VW-M will exhibit its new line of rectifiers for the metal finishing industry. These units are designed for specific applications of barrel plating, general plating and anodizing. Several new processes will be on display for the first time. These will be Duralume, a sulphur-free semi-bright deposit with high ductility and levelling characteristics; Copperlume, a high-speed, bright cyanide copper plate process which yields a mirror-bright finish; and Zincalume, a bright, still-tank, cyanide zinc process which produces high luster over a wide current density range. Also several entirely new aluminum processes and a motorized barrel plating unit and centrifugal dryer.

Refer to page 76.

Hardwood Line Mfg. Co. 83

2022 N. California, Chicago 47, Ill.

Angelo Lozaro

Lazo Lucite Plating Barrels.

Refer to page 130.

The Harshaw Chemical Company 267-269

1945 E. 97th St., Cleveland 6, Ohio.

Technical and Sales personnel in attendance.

Perflow-Perglow nickel plating process. A duplex nickel deposit of corrosion resistance and other plating processes.

Refer to pages 20, 21.

Haviland Products Company 289

421 Ann Street, N.W., Grand Rapids 2, Michigan.

J. M. Haviland, General Mgr.; O. D. Hoxie, Laboratory Dir.; C. H. Roach, Dir. of Sales; Gordon Lee, Sales Mgr.; Hugh Brown, "Bud" Builtinan, George Ambrose, Ed Haan, Jim Wolfe, Don Bazzett, Ralph Brouwer—Salesmen.

Metal finishing surfactants.

Heatbath Corporation 291-293

Box 78, Springfield, Mass.

E. A. Walen, Jr., Vice-Pres. & Sales Mgr.; D. R. Barber, General Mgr.; J. B. Wheeler, Dist. Sales Mgr.; J. C. Drinkwater, Peter Petroff, R. G. Wild, M. A. Focht, B. C. Lindstrom, J. W. Azzolino, all Technical Sales Representatives; A. A. Kirkitelos, Technical Service.

Black Oxide finishes for steel, iron, stainless steel, copper, brass and zinc, and nickel pentrate. Duracoat Chromate Conversion Coatings for zinc, cadmium, copper, brass and aluminum. Aluminum Finishing — includes cleaning, etching, brite dipping, deoxidizing, chemical polishing, deburring, protection and plating on aluminum. Specialty metal finishing products — including strippers, cleaners and rustproofing compounds. Colored finishes for zinc plated articles featuring theme "Color Sells."

Heil Process Equipment Corp. 285 & 288

12901 Elmwood Ave., Cleveland 11, Ohio.

C. E. Heil, President; E. W. Vereeke, Exec. Vice-Pres.; H. P. Heil, Vice-Pres.; Gene Gwyer, Sales Rep., Michigan State; R. E. Scheel, Mgr. Western Sales; F. W. Arndt, Chief Engineer; R. I. Peters, Assistant Engineer.

Operating model of complete Ventilation system, including Heilastic lined acid tank supplied, Nocordal Impervious Graphite heating equipment, Rigidon (solid plastic) exhaust hoods duct work, stack and exhaust fan, a pack tower type fume scrubber, Heil Lead Anodes for plating, portable acid storage tanks and other plastic fabrications of Rigivin (rigid vinyl), Rigidene (polyethylene), and Rigipro (polypropylene).

Refer to page 728.

Hitchcock Publications .....92 and 93

"Grinding & Finishing Magazine"

Wheaton, Illinois.

V. C. Hogren.

R. O. Hull & Co., Inc. .....81 and 82

1300 Parsons Court, Rocky River 16, Ohio.

R. O. Hull, Jr., Exec. V.-P.; Curtis Miller, V.-P. Sales; J. L. Jackson, Technical Service Dir.; Jos. Zehnder, Chief Research Chemist; Duane Black, Ass't. Research Chemist; George Bartle, Sales & Service Rep.; Stanley Beauregard, Ted Betz, Roy Critchfield, Herb Geduld, Bill Lang, Joe Manzella, Bob Parker and John Weyls, all Sales and Service Representatives.

Rohco plating and anodizing test equipment with various types of Hull Cells and related for bath control, and Anodicator for testing thickness of anodizing. Rohco addition agents and special purpose chemical products and finishes they produce in bright cadmium, copper, and zinc plating. A newly designed, portable heat exchanger for heating or cooling most acid or alkali solutions.

Refer to page 68.

Industrial Filter & Pump Mfg. Co. 139 thru 142

5900 Ogden, Cicero, Illinois.

James F. Zievers, Gen. Sales Mgr.; Ted Sward, Dir. of Special Programs; Chic Weege, Ken Johnson, Bill Wallin and Rocky Gray.

Micro-Mite Electroplating filter. Literature and bulletins on filters, waste disposals, rubber lined pumps, rubber linings, ion exchangers, water softeners and corrosion testing equipment.

Refer to page 22.

Industrial Instruments, Inc. 216

89 Commerce Road, Cedar Grove, N. J.

Lee Anger, Representative; Jim Vetowich, Representative; John H. Williamson, Sales.

Instruments for measurement and control of rinse tank controllers; instrumentation for measurement and control of electrolytic conductivity; contamination of return steam (process steam); purity of water.

Refer to page 72.

Industrial Plastic Fabricators, Inc. 135 and 136
Endicott Street, Norwood, Mass.
P. R. Chamberlain, President; J. P. O'Connor, Jr., Sales Manager; Harry A. Reed, and E. M. Vorel, Detroit Representatives.
A PVC and a Fiberglass Centrifugal Fan, a PVC Air Washer, a Model PVC Exhaust System, and a PVC Utility Blower.

The International Nickel Co., Inc. 189-190
67 Wall Street, New York 5, N. Y.
W. H. Prine, Plating Sales Mgr.; W. W. Sellers, Primary Nickel Dept.; C. H. Sample, Supv. of Product Development on Electroplating; C. B. Sanborn, D & R Div.; B. B. Knapp, Bayonne Research Lab.; F. X. Carlin, Bayonne Research Lab.; W. G. Borner, Bayonne Research Lab.
Display will stress how Inco promotes progress in nickel plating for industry through: Research, both in own laboratories and by Inco-sponsored projects carried on elsewhere; market development work on electroplating; technical literature on electroplating.

Ionic Electrostatic Corporation 277-280
111 Monroe Street, Garfield, N. J.
John Sedlacsik, Jr., President; Cornelius Breen, General Mgr.; Louis Buono, Jr., Sales Engineering Div.; Maurice Zapeikov, Sales Engineering Div.; Theodore James, Sales Representative.
Electrostatic spray equipment. Model M-50 Multi-Color Centrifugal Disc Type electrostatic spray equipment. Model 12 Centrifugal cone type atomizers. New Model 10 electrostatic hand gun. Various other electrostatic guns, nozzles, power supplies, etc.

Kocour Company ..... 67 and 68
4800 S. St. Louis Ave., Chicago 32, Ill.
Cyril Kocour, President; Orville Kocour, Sales Manager; E. F. Jablonski, Adv. Mgr.; E. A. Hodges, Laboratory Dir.; Walter Warner, Sales Rep.
Kocour Analytical Sets and Test Equipment for plating Solution Analysis — Automatic Dropping Units for Thickness Testing, pH control, continuous demonstration of the Kocour Electronic Thickness Tester Model 955; Kocour Buffing Compounds, polishing Greases, and Metal Finishing Supplies.
Refer to page 50.

Kolene Corporation ..... 114 & 115
12890 Westwood Ave., Detroit 23, Mich.
J. H. Shoemaker, Pres.; R. H. Shoemaker, Vice-Pres.; W. P. Ziegler, District Sales Mgr.; John A. Faler, Chief Engr.; Geno Toffanetti, Field Service Engr.; D. J. Shoemaker, Plant Sup't.; D. F. Low, Sales Engineer.
New process for de-enameling, #5 salt bath stripping of reject parts, conveyor hooks for epoxies, acrylics, plastisol; Process for preparing cast iron surfaces prior to plating, tinning, brazing, other bonding applications; Salt bath descaling stainless steel, nickel alloys, molybdenum, titanium, and other material. Descaling and de-sanding of castings; Batch and conveyorized equipment for various cleaning and surface preparation applications.

Kraft Chemical Company 9
917 West 18th St., Chicago 8, Ill.
Gerald G. Kraft, Gen. Mgr.; Lloyd Dunn, Sales Engineer; Roger Cassidy, Technical Sales Engineer.
Kraft's booth in yellow and black (national safety colors) features "Safer" Cya-Nodes—the flake, dust and sulfur free form of potassium cyanide. Another feature of the booth will be the daily posting of the recipients of the daily "public relations award." Information about this award is available at the booth. Literature on Kraft's over 500 "in stock" items for the plating, paint, rubber and ceramic industries will be available.

Lasalco, Inc. 327-330
2818-38 LaSalle St., St. Louis 4, Mo.
A. G. Bignall, President; N. K. House, Vice-Pres. and Sales Mgr.; F. A. Menniges, and B. G. Daw, both Sales Engineers.
Automatic Plating Machine (Selectomatic) designed for two or more cycles. The operator can set a dial on each carrier to select a given cycle which will then act independent of the other. One Belt Driven Plating Barrel.
Refer to page 29.

The Lea Manufacturing Co. 204 and 205
16 Cherry Ave., Waterbury, Conn.

Lea-Ronal, Inc.
139-20 109th Ave., Jamaica, L. I., N. Y.
Earle W. Couch, President; R. P. Crane, Vice-Pres. in charge of Sales; Dr. H. L. Kellner, Director of Research; D. F. Mosher, Mgr. of Lea-Michigan; B. D. Ostrow, Mgr. of Lea-Ronal; Fred Nobel, Electroplating Engineer; Francis Bergin, Product Mgr. Liquabrade; S. L. Doughty, Electrochemical Sales; John Guss, Electrochemical Sales; Wm. Millman, Electrochemical Service; Leo J. Bakinow, Sales Promotion Mgr.
Technical Information Center on the latest techniques and procedures for surface finishing of all materials using abrasive compositions, with emphasis on liquid abrasive composition spray buffing for bright finishes and satin finishes, and bright high speed electroplating processed for both decorative and industrial plating.
Refer to pages 31-34.

Arthur H. Losey Company 78
110 S. Horton St., Jackson, Michigan.
Arthur H. Losey, Mrs. Arthur H. Losey, Eugene Crisenbery, John Miller.
Automatic buffing machines.

Lyon, Inc. 75
13881 W. Chicago, Detroit, Mich.
Buffing wheels.

MacDermid Incorporated .. 185 thru 188
526 Huntingdon Ave., Waterbury 20, Conn.
Harold Leever, Pres.; S. S. Krentel, Exec. Vice-Pres.; A. R. McNeil, Vice-Pres.; W. P. Innes, Technical Dir.; Dr. A. L. Taylor, Dir. of Research, Ferndale; Dr. Erich Laue, Dir. of Research, Waterbury; J. D. Patrick, Product Dev. Eng.; G. C. Kastner, C. L. Capobianco, Fenton Liffick, James Warren, J. T. Sullivan, Frank Hartwig, A. J. Dankevich, R. L. Nyquist, John Leever, W. J. Dyber, L. N. Davies, A. J. Butterer, Arnold Kurth, E. F. Stack, Harold Lazaar, A. A. Ferguson, G. J. Osterfield, Edward Cox, C. F. Thornton, W. D. Gordon, Fred Johnson, Claude Weekly, Clyde Lowe, Daniel Ross, Raymond Dargis.
MacDermid Inc. will demonstrate by means of actual parts and color photographs new developments in cleaning, stripping, copper plating, dry acid salts, bright dipping and electropolishing, chromate conversion coatings and burnishing.
Refer to Back Cover.

Manpro Corporation ..... 131 and 132
1360 Hilton Rd., Ferndale, Mich.
R. C. White, President; R. C. Driscoll, Salesman, W. C. Carnegie, Salesman.
Manpro Vibra Degreaser.

McAleer Manufacturing Corp. 254 and 255
101 S. Waterman, Detroit 17, Mich.
C. H. McAleer, President; Edw. Van Zandt, Industrial Sales Mgr.; H. E. Anderson, Territory Rep.; C. E. Dodd, Territory Rep.
Polishing and buffing compounds (Cast, Extruded and Liquids). Complete line of Buffs.

McGean Chemical Company 169 and 170
1040 Midland Bldg., Cleveland 15, Ohio.
Ralph L. McGean, Vice-Pres.; Paul M. Savage, Secretary; D. L. Whitney, Treasurer; W. P. Devan, Detroit Rep.; S. B. Cowdery, Sales; J. J. Becker, Sales; W. L. Pinner, Mgr. Electroplating Development; B. G. Allen, Sales; R. D. Savage, Sales.
Various anodes and plating chemicals featuring New Type McGean Cast Besplate Nickel Anodes, 99% plus.
Refer to page 39.

Merit Products, Inc. 173
3691 Lenawee Ave., Los Angeles 16, Calif.
Wm. G. Gillett, Production Mgr.; Alec Block, Gen'l Mgr.; O. B. McGregor, Asst. Sales Manager; R. M. Block, Area Sales Rep.
Coated abrasive flap-type wheels for polish-grinding and satin-finishing metals, plastics, etc., on contoured and flat surfaces. Wheels will be mounted on various buffing spindles.
Refer to page 62.

Metal & Thermit Corporation .. 199-203
Woodbridge Rd., Rahway, N. J.
Sales Div.—H. D. McLeese, H. Buchanan, H. Malhstedt, R. D. Dudley, W. W. Brodin, J. W. Dunn, F. H. Haas, E. W. Rehme, I. M. Weiss, C. W. Carter, R. E. Collins, E. M. Tinnon, E. N. Riotte, R. Dow, K. D. Ford, V. E. Guernsey; L. B. Quirk, K. Wagner, F. Fulforth, F. Connor. Research Div.—Dr. J. Stareck, Dr. F. Lowenheim, Dr. G. Dubpernell, Dr. E. Syeb, R. Couch, F. Passal.
Principal display will be on the increased corrosion resistance available through the use of thicker chromium. Will also

feature Unichrome textured vinyl dispersion finishes on plain and textured steel. New cyanide copper and colored dip finishes to be shown.

Refer to pages 60, 74.

Metals & Plastics Publications, Inc. Historical Feature Lounge B
381 Broadway, Westwood, N. J.
Joan T. Wiarda, Pres. and Adv. Director; Palmer H. Langdon, Publisher; John E. Trumbour, Business Mgr.; Nathaniel Hall, Technical Editor; Jerry O'Brien, Market Research Mgr.; Dave Kingwill, Advertising Representative.
Metal Finishing portrays some of the early history of finishes and finishing going back to 1903. Copies of METAL FINISHING will be distributed.

Michigan Buff Co., Inc. .....79 and 80
3503 Gaylord Ave., Detroit 12, Mich.
A. W. Payson, President; Oliver J. Horsch, Sales Mgr.; A. J. Becker, Jr., Sales; Arthur Yeates, Sales.
Buffs, Polishing Wheels, Buffing supplies, Polishing equipment.

Refer to page 148.

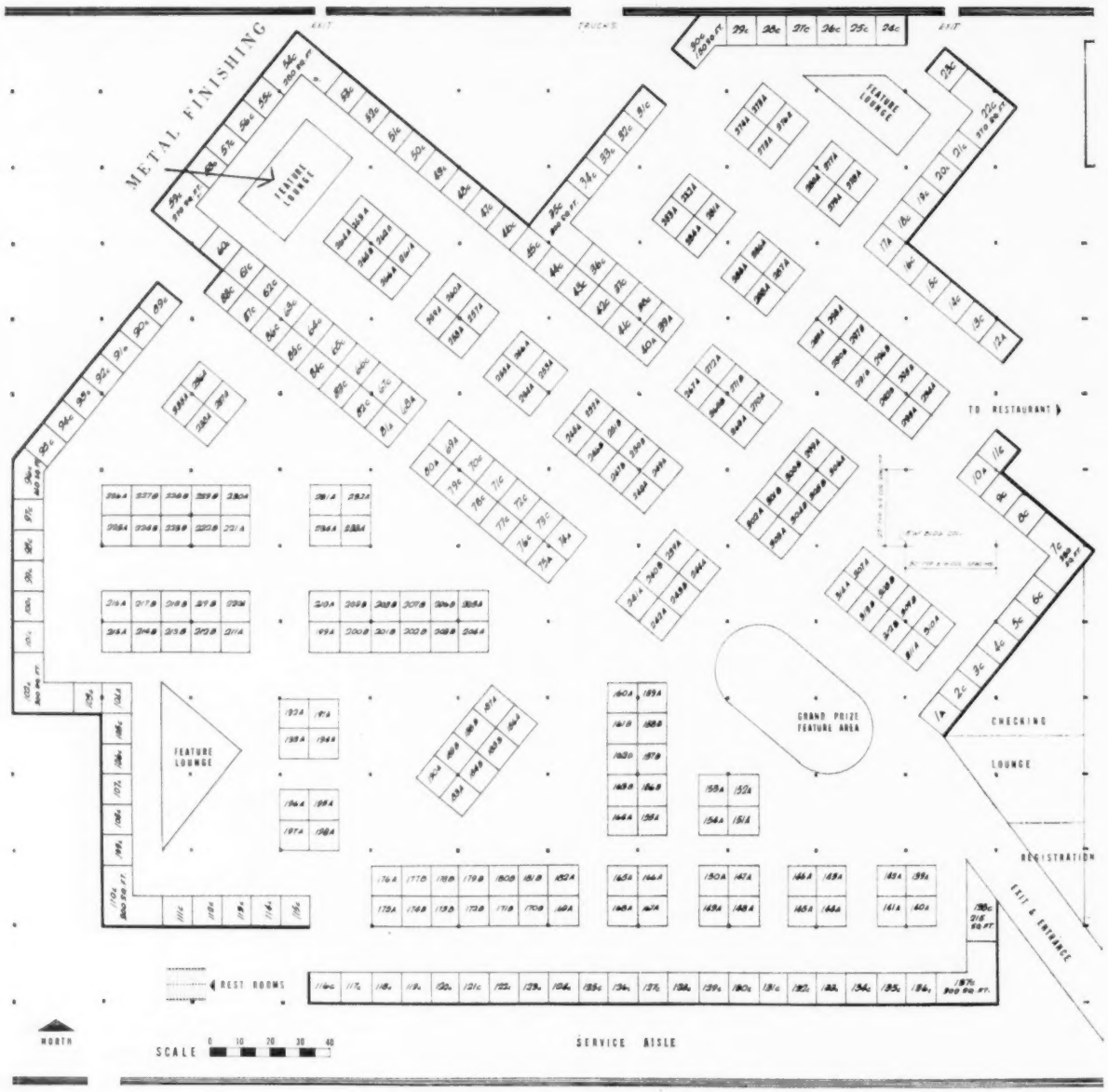
Michigan Chrome & Chemical Co. 16
8615 Grinnell, Detroit 7, Michigan.
King Ruhly, Sales Mgr., Chem. Div.; Allen Russell, Dist. Mgr.; Al Neeme, Dist. Mgr.; Bob Richards, Dist. Mgr.; Don Patterson, Sales Rep.; Earl Kunish, Sales Rep.; Charles Fossati, Sales Rep.; Ted Root, Sales Rep.
Samples of Rack Coatings, Stop-Off Materials, Tank and Duct Coatings, and Miccron-Powdered Resins, materials and equipment.

Minnesota Mining & Mfg. Co. 38 and 39
900 Bush Avenue, St. Paul, Minn.
J. E. Linstroth.
Honite brand barreling finishing media and compounds.

Murray-Way Corporation ....96 thru 98
Box 180, Birmingham, Mich.
E. E. Murray.

NRC Equipment Corporation 57 and 58
160 Charlamont St., Newton 61, Mass.
Harry D. Stone, Sales Mgr.; Francis X. Maher, Dist. Mgr.; Robert J. Amis, Sales Eng.; Howard M. Farrow, Product Mgr.;

FLOOR PLAN OF EXPOSITION HALL



Byron Ellis, Dist. Mgr.; Gilbert King, Jr., Sales Promotion Mgr.
High vacuum coating equipment with representative samples. Featured will be new developments in: Vacuum coating equipment, durability and quality of finish, and materials which can be coated. Exhibit will emphasize automotive application and point out opportunities for electroplaters to broaden their markets to include the plastics industry.

George L. Nankervis Company **51**
15400 Fullerton Ave., Detroit 27, Mich.
C. Civan, William Katke, K. Brocklehurst, A. Giaier, K. Battjes.
Set up for full operation with pumps, chlorine gas receptacles and a caustic proportioning feeder. This equipment will be shown in cooperation with Wallace and Tiernan, manufacturers of the control apparatus for the packaged unit.
Refer to page 142.

National Ass'n. of Metal Finishers **138**
60 Bently Rd., Cedar Grove, N. J.
W. B. Knight.
Publication

National Carbon Company, Division of Union Carbide Corporation ..**84**
30 East 42nd St., New York 17, N. Y.
J. J. Behen, J. R. Brauning, J. M. Brown, J. Knott, F. K. Lutz.
"Karbate" Impervious Graphite including heat exchangers, pumps, pipe & fittings for handling a wide range of corrosive plating solutions and "National" metal-graphite and electrographitic brushes for plating generators.

New Holland Machine Co. **125**
New Holland, Pa.
John Ressler, Asst. to Merchandising Manager; J. Frank Powl, Plant Mgr.
New Holland Kreider Centrifugal Dryers.
Refer to page 138.

Nordson Corporation **89**
Jackson St., Amherst, Ohio.
Jack Dunn, Sales Rep.; Ronald Meyer, Sales Rep.; R. T. Schafer, Asst. to the President.
Demonstration of Nordson Airless Spray Coating Equipment.

Oakite Products, Inc. .....**72 and 73**
19 Rector St., New York 6, N. Y.
M. F. Maher, Jr., Mgr., Metal Industries Div.; D. X. Clarin, Mgr., Metropolitan New York Div.; T. R. Smith, Mgr., Detroit Div.; G. A. Lux, Dir. Tech. Education; R. F. Ayres, Research Section Leader; Tech. Serv. Reps.: R. J. Crane, D. W. O'Leary, J. E. Sauve, V. Heinrich, Nick Carter, G. I. Reuter, W. C. Mueller, M. R. Stevens, A. V. Corbit.
Electrocleaning for steel, brass, zinc; barrel finishing compounds — for deburring, descaling, derusting, brightening, burnishing, as well as cleaning; compounds for cleaning, deoxidizing, etching aluminum; Oakite CrysCoat phosphate coatings for ferrous metals; Oakite ChromiCoat for conversion coating of aluminum.
Refer to page 4.

Pennsalt Chemicals Corporation **7**
3 Penn Center, Philadelphia 2, Pa.
C. R. Sorber, Dist. Sales Mgr., Detroit; W. R. Cleary, Sales Rep., Detroit area; B. T. Scott, Sales Rep., Detroit area; E. W. Wilson, Mgr. of Steel Mill Sales; R. M. Burford, Dist. Sales Mgr., Pittsburgh area; J. M. Davidson, Gen'l Sales Mgr.; H. F. McIntyre, Industry Mgr.; S. J. Barlett, Mgr. of Equip. Sales; Gene Edwards, Service Engineer; F. C. Leensvaart, Dist. Sales Mgr., Chicago area; P. C. Rech, Industry Mgr.; B. C. Ricca, Dist. Sales Mgr. Philadelphia area; W. D. Wilson, Dist. Sales Mgr., Cincinnati; W. T. West, Service Engineer.
Pennsalt will have on display two small units of cleaning equipment: A new model combination wash and rinse spray cabinet washer and an air operated agitating washer.

Perma-Line Rubber Products Corp. **15**
1755 N. Winnebago Ave., Chicago 47, Ill.
John W. Blaydes, President; Jack B. Major, Sales Engineer.
New item — the Professional PVC Tank Lining Repair Tools, and variety of tank linings and an acid transportation buggy.
Refer to page 59.

Phillips Manufacturing Co. ..**47 and 48**
3475 W. Touhy Ave., Chicago 45, Ill.
L. R. Anderson, Vice-Pres.; E. Werner, Pres.; H. L. Burnham, Rep.; John Ott, Rep.; E. L. Plassmeyer, Chief Eng.
Model Monorail Conveyor Degreaser, Ultrasonic Degreaser, Standard Steam Heated Liquid, Vapor Degreaser.

Platers Research Corporation **247**
59 E. 4th St., New York 3, N. Y.
A. T. Marinaro, Managing Director; Charles Geldzahler, Tech. Director; Louis Packman, Sales Manager.
Chemical and Mechanical Products display. Bicycle frame showing various Platers Research products used in manufacturing process including Rustaway 77, Alkaline Derusting process and Sundry Products.

Plating Magazine
Fiftieth Anniversary Lounge A
445 Broad St., Newark, N. J.
A.E.S. Research Program.

Pressure Blast Mfg. Co., Inc. **53**
27 Pleasant St., Manchester, Conn.
Savin Zavarella, President: Helen McMullen, Sec'y-Treas.
Carlson Equipment & Supply Co.—H. T. Carlson, President.
R. J. McComb Associates—R. J. McComb, President; J. Bizzarre, Sales Mgr.
Wet blasting equipment and abrasives.

Productive Equipment Corporation **85 & 86**
2926 W. Lake St., Chicago 12, Ill.
L. H. Lehman, V.P. & Sales Mgr.; G. W. Dwyer, President: L. M. Haluch, Ass't. Sales Mgr.
Finishing metal parts in 1 cu. ft. Selectro Vibro-Finisher. Demonstrating operation of 10.5 cu. ft. unit.

Products Finishing Magazine
Feature Lounge C
431 Main Street, Cincinnati 2, Ohio.
Ezra Blount.
Plating equipment of "yesterday."

Rampe Manufacturing Co. **69**
14915 Woodworth Ave., Cleveland 10, Ohio.
John F. Rampe, President; Cranston Jones, James May, Representatives.
Precision Barrel Finishing equipment — various models and sizes, in operation.

Ransburg Electro-Coating Corp. **54**
P.O. Box 23122, Indianapolis 23, Ind.
Reno Offringa, Dist. Sales Mgr.; Jack Snyder, Art Guidotti, Ralph Jones, all Sales Engineers; Harold Hatten, Engineer.
Live demonstration of No. 2 Electro-Spray Process Hand Spray Gun, plus a new movie "Guided Mist" featuring this new gun, plus automatic No. 2 Process equipment on display.

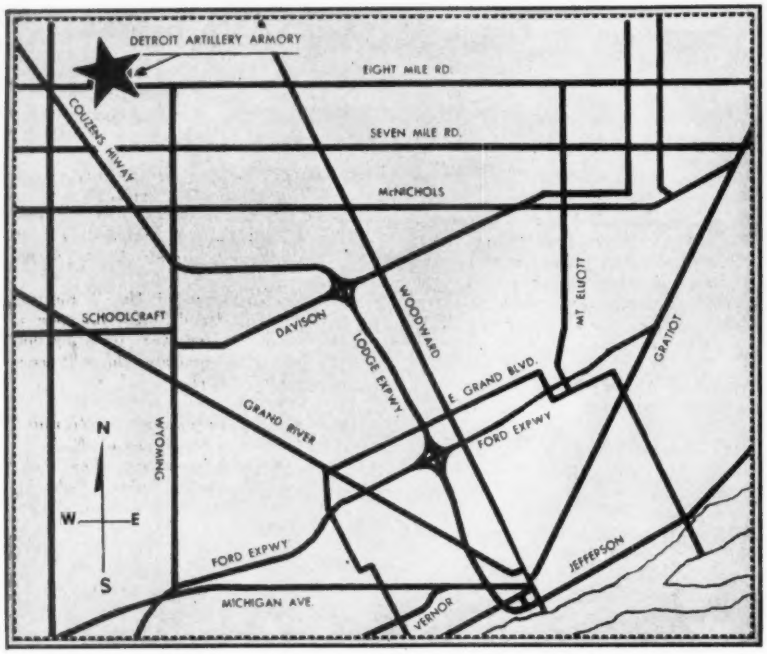
Rapid Electric Company .....**76 and 77**
2881 Middleton Rd., Bronx 61, N. Y.
James A. Viola, President; Don Weir, Asst. to President; Robert Tedeschi, Adv. Mgr.; George Demirsian, Representative.
Selenium-Germanium-Silicon D.C. Power Rectifiers; magnetic amplifiers controls with automatic voltage stabilization and automatic current control.
Refer to page 6.

Republic Lead Equipment Co. **297**
7930 Jones Rd., Cleveland, O.
Lead anodes.

Reynolds Metals Company .. **133 & 134**
6601 W. Broad St., Richmond 18, Va.
Richard Darrow, Finishing Engineer; Jack B. Kerr, Finishing Engineer.
Demonstration of anodizing operation.

Schaffner Buff Company
Schaffner Mfg. Co., Inc. 183 & 184
27 Herron Ave., Pittsburgh 2, Pa.
Gus J. Schaffner, Jr., Chairman of Board; Paul E. Schaffner, President; Robert D. Schaffner, Vice-Pres.; James R. Schaffner, Sec'y and Treas.; W. A. Nelson, Robert Pinchot, Peter Verlinich, Eugene O. Eagle, Norman McAndrew—Sales Representatives.
Buffs and compositions.
Refer to page 146.

Sel-Rex Corporation .....**235 thru 238**
75 River Rd., Nutley 10, N. J.
Stan Wilson, Vice Pres. & Gen'l Sales Mgr.; E. C. Rinker, Vice Pres. & Technical Director; Precious Metals Division; Al Korbelak, Mgr. New Product Development, Precious Metals Division; Sid Mitwol, Gen'l Mgr. Rectifier Division; Jerry Ross, Mgr. Equipment Division; Paul Harper, Sales Engineer in charge of West Coast Division; Peter Stevens, Sales Engineer in charge of Chicago Office; Rene Sonnenfeldt, Sales Engineer; Carl Dowling, Sales Engineer; Morris M. Messing, President.
The theme of the Sel-Rex exhibit will be FROM MISSILES AND ROCKETS TO MiSSES AND LOCKETS; i.e., on display will be equipment, materials and supplies for metal finishing and electroplating applications from precise engineering applications to the decorative as exemplified by jewelry products manufacturing. The exhibit will contain samples of products commercially pro-



Location of Armory in relation to downtown Detroit.

duced which use a Sel-Rex Precious Metals Process electroplate and/or which have been produced with Sel-Rex engineered and installed equipment and machinery. This will include electronic equipment and circuitry used on the earth and sun satellites, guided missiles, the newest rockets, as well as samples of jewelry Karatclad Gold Plating in operation.

Refer to pages 63, 64, 153.

Servi-Sure Mfg. Co. **70**
131 N. Green St., Chicago 7, Ill.
James K. Trinz, Vice-President; Ernest Rosner, President.
Modern methods of anodizing racking. Adjustable Titanium Racks to minimize retooling for style and model changes. Special racks for high-production items will also be featured. Visitors are invited to bring sample piece-parts for on-the-spot consultations regarding racking methods.

Sethco Manufacturing Corp. **65**
2284 Babylon Turnpike, Merrick, N. Y.
J. L. Englesberg, Chemical Engr.; W. J. Otto, Production Mgr.: M. Stoneman, Advertising Mgr.; Mrs. E. Englesberg, Sales.
Filters and filter pump units designed with specific components of construction to meet specialized filtering applications. Particular attention is being directed to the solutions such as precious metals, bright nickels, cyanides and ultrasonic cleaners as well as others requiring filtration. An improved all-in-one model will be shown featuring a "canned" pump housed in the motor . . . with stainless steel or full view filter chamber stacked-in-line. Another will be a "sump pump" and filter for in-tank application. Also displayed will be several standard Sethco units representing the company's full line of filter pump units from 50 to 3000 gals. per hour capacity.

Refer to page 121.

J. J. Siefen Company .....**250 and 251**
5657 Lauderdale, Detroit 9, Mich.
C. A. DeGroat, General Manager; Ralph Hale, Sales Manager; D. W. Trethric, Asst. Sales Manager; V. C. McBride, E. A. Brisson, T. Bernstein, A. Darnell, C. C. Elliott, Louis Misenti, all Sales Engineers.
Two Acme Buffing Heads in connection with Siefen Liquid Buffing Spraying equipment.

Refer to page 8.

Siefen Compounds, Inc. **23**
14325 Wisconsin Ave., Detroit 38, Mich.
John F. Siefen, President and Gen'l Manager; George D. Foster, Draw'll Products Sales Manager; Charles W. Mayo, Equipment Engineer; Leonard E. Pravel, Sales Engineer.
Spray equipment including spray guns, controls, gun movers and liquid buffing compounds.

Sifco Metachemical, Inc. .....**122 & 123**
935 East 63rd St., Cleveland 3, Ohio.
Dennis Hughes, Ben Schwartz, Stanley Ogden, Joe Popely, A. H. Milnes—Pres.
Dalic Process of selective plating, micrograin nickel plating of electroforms, hard chromium plating, chromium plating of aluminum, chromium plating on molybdenum, nickel plating on titanium, plating on plastic.

Solventol Chemical Products, Inc. .....**174 and 175**
15841 Second Ave., Detroit 3, Mich.
C. A. German, Industrial Sales Mgr.; G. Alandt, K. O. Lenhard, R. W. Fraser, J. W. Ninnemann and R. Woodman, all Sales Representatives.

Sparkler Manufacturing Company **286 & 287**
169 North Lake St., Mundelein, Ill.
W. S. Mullen, President, Mullen Pump and Supply Co., Detroit, and Michigan Representative of Sparkler Mfg. Co. D. F. Cooper, Manager, Industrial Sales Div., Sparkler Mfg. Co.
Filtration equipment engineered for the particular problems encountered in the electroplating industry.
Featured will be a fully automated Sparkler Model RSC filter designed for either dry or wet cake discharge. Filter runs without supervision. Working models of other types of filters will be displayed. Another featured item will be the Sparkler Wash-off Cartridge which was conceived and engineered for platers. Complete Wash-off filters as well as cartridges for existing filters will be shown.

Standard Plating Rack Co. **252**
1925 N. Paulina St., Chicago, Ill.
Max Schneider, John Maslowicz, Chester Beyer and R. W. Gates.
Plating racks. Shot peening masks, paint masks and plating masks.

Refer to page 38.

Frederic B. Stevens, Inc. **191-194**
1800 18th St., Detroit 16, Mich.
A. B. Hoefer, Vice-Pres.; Frank Watt, Gen'l Sales Mgr.; Guy Cummings, Sales Mgr. Metal Finishing Equipment and Supplies; D. J. Swaninger, Manager of Buffing Composition Sales; Willis Thompson, Chief Chemist; W. G. Anderson, Advertising Manager; Salesmen from Detroit and other areas.
12' working model of "Little Steve" Plating and Processing Machine; working model of new Roto-Finish machine; 16mm. film on new Stevens Equipment; Stevens buffing and polishing compositions, automatic applicators, wheels and buffs; Products that have been plated, polished and buffed on Stevens' equipment or through the use of Stevens compounds.

Refer to pages 44, 45, 110.

F. J. Stokes Corporation .....**94 and 95**
5500 Tabor Rd., Philadelphia 20, Pa.
A. D. Garwood, Mgr., Vacuum Metallurgical Dept.; M. B. Gilbert, Product Mgr., Vacuum Metalizing; W. E. Henneman, M. S. Adler, R. H. Watkins, J. A. West, all Sales Engineers.
An in-operation demonstration of the new Stokes Model 425-3 24-inch diameter vacuum metalizing unit. This equipment, introduced for the first time to the industrial finishing industry, will feature push-button controls, completely self-contained construction and will be capable of short cycles and low-cost production. Background display will feature decorative finishes on both plastic and metal base appliance hardware and trim, automotive trim and styling details, jewelry, package closures, electrical condensers and resistors and heavy deposits for corrosion-protection on such large structural members as aircraft landing gear struts.

The Stutz Company .....**257 and 260**
4450 Carroll Ave., Chicago 24, Ill.
George Stutz and Joseph B. Niles.
Mechanical Plating Equipment.
Refer to page 24.

Technic, Inc. **217**
39 Snow St., Providence, R. I.
A. M. Weisberg, Vice-Pres.; Dr. E. A. Parker, Technical Dir.; H. L. Ferguson, Plating Eng.; G. J. Naves, Jr., Sales Rep.
Precious Metal Electroplating Metallurgy.
Refer to pages 46, 75.

Ther Electric & Machine Works
258 & 259
17 S. Jefferson, Chicago 6, Ill.
Charles F. Norcross, Sales Mgr.; Phillip H. Watt, Engineer.
Plating rectifier equipment with particular emphasis on the latest methods, materials, and styles in rectifiers as well as display of research projects in the rectifier field.

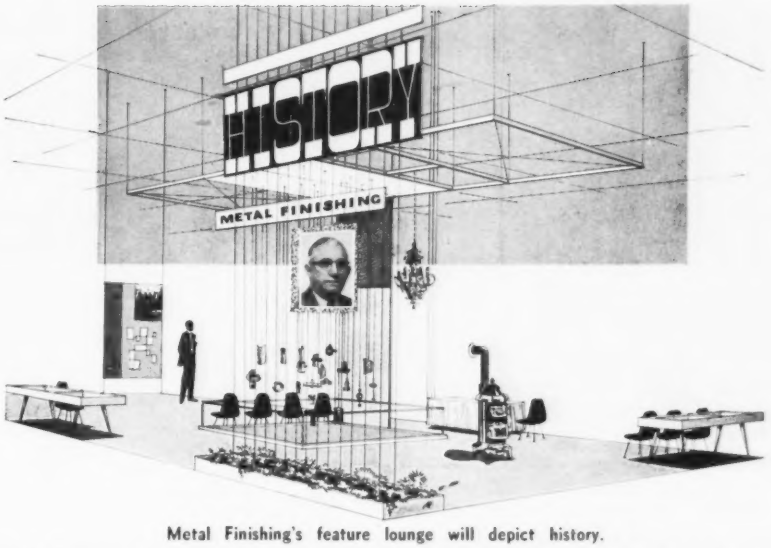
Tranter Mfg. Inc. .....**214 and 215**
735 E. Hazel St., Lansing 9, Mich.
Lee S. Worthington.
Platecoil equipment — shown in cutaway tank applications.

H. O. Trerice Co. .....**253 and 256**
1420 W. Lafayette, Detroit, Mich.
Ray Hartmann, Lou Smith, Stanley Kales, Fred Dohn, S. B. Mercer, Ed Feys, J. L. Brackett.
Complete exhibit of temperature and pressure control instruments for the metal finishing industry including washing, plating, anodizing, drying, etc. Will feature self operating, air-operated and electric controls. Also, our duplex control for heating and cooling, such as on anodizing, chrome and nickel plating, etc.

Turco Products, Inc. .....**226 and 227**
Terminal Annex 2649, Los Angeles 54, Calif.
C. F. Devine, Mgr. Public Relations & Advertising; Paul Rebel, Jr., District Mgr.; O. R. Jackson, Mgr. Metal Processing Div.; Art Mason, Sales Rept.; John Wanty, Sales Rept.
Miniature tanks in operation to demonstrate Turcoat 4474, a new low temperature phosphating compound. In another series of miniature tanks, a demonstration Turcoat 4178, our aluminum conversion coating.

Udylite Corp. **239-244**
Detroit 11, Mich.
R. C. Trees.
Refer to pages 18, 19.

Unit Process Assemblies, Inc. **248**
61 East 4th Street, New York 3, N. Y.
S. U. Lieber, Sales Manager; L. Packman, Sales.
New Dermitron Nondestructive Coating Thickness Tester, Model D-2, which measures all metallic and non-metallic coatings. Periodic-Reverse and C. I. Units for Plating, Alkaline Derusting and Descaling.
Refer to pages 139, 143.



Metal Finishing's feature lounge will depict history.

U. S. Stoneware Co. **298**
220 W. Market St., Akron, Ohio.
Howard Farkas, Vice-Pres.; W. B. Carrell, Sales Mgr.; Arden Follin, Coatings Division; Alen Harkins, Linings Division; L. E. Wybel, Sales Rep.; L. R. Schlundt, Pres. of Republic Lead Equip. Co.; R. C. Gross, Pres., Ralph Gross Adv. Co.; William P. Bishop, Account Exec.
Tygon Protective coatings, Fume scrubbing equipment, Plating tank linings, Plastisol coatings, Acid-proof brick flooring, Tygon tubings and Chrome plating anodes by Republic Lead Equipment Co.

Universal Tumbling Supply Co. **46**
18613 Lancashire, Detroit 23, Mich.
C. R. Schuur, D. C. Schuur.
Tumbling chips, compounds, etc.

Univertical Foundry & Machine
163 and 164
14841 Meyers Rd., Detroit 27, Mich.
C. T. Walker.
Anodes, plating supplies.
Refer to page 136.

Vanton Pump & Equipment Corp. 210
Div. of Cooper Alloy Corp.
Hillside, N. J.
Jerry Lewis, Sales Mgr.; Morton C. Myers, Gen'l Sales Mgr.; Pete Obear, Don Leiser, Paul Rossbach, Stan Lind, Felix Mirucki, all Sales Representatives.
Complete line of Plastic Sealless Pumps constructed of such materials as Teflon, Polyethelene, Polyvinyl Chlorine, Bakelite and Stainless Steel. Also new all Plastic Centrifugal Pumps of PVC and Polypropylene. A line of plastic Flex Plug Gate Valves incorporating features of Gate and Globe Valves, and line of PVC Pipe Line Strainers.

A. T. Wagner Company **66**
2720 Wight St., Detroit 7, Mich.
Kenneth Wray, Vice-President; Harry Pinson, Metalurgist; C. W. Scott, Sales Engineer.
Supplies.

Wayne Products Corporation **10**
114 Olive St., Palatine, Ill.
Wayne Goodpasture, President; Jack Berg, Sales Manager; Al Berdnick, Shop Supt.
Plating filters, pumps, baskets and tanks.

Westinghouse Electric
Corporation **195-198**
Electroplating Projects Dept.
700 Braddock Ave., East Pittsburgh, Pa.
Carl G. Reinheimer, Jr., Sales Mgr.; Myron Ceresa, Engineering Manager; James Kristofik, Salesman; James R. Crain, Engineer.
Westinghouse plating processes will be demonstrated on a number of various applications.

Wheelabrator Corporation ..118 and 119
Techline Division.
2400 Avenue V, Vicksburg, Mich.
Lee D. Stevens, Plant Mgr.; G. H. Lieser, Field Sales Mgr.; J. A. Schmidt, General Mgr.; C. A. Elzinga, Representative.
The backwall will be covered with typical pieces in the "before" and "after" cleaned or finished stage to demonstrate the versatility of barrel finishing or wet blasting. A Techline Model 30 Barrel and a Model 43 Liquamatte wet blast machine will be exhibited. Also a complete range of sizes and types of Techline media, compounds and abrasives.

Wyandotte Chemicals Corp. **157-159**
Wyandotte, Michigan.
P. N. Burkard, Mgr. Industrial, Railroad & Aircraft Sales; E. J. Kubis, Mgr. Metal Finishing Sales; T. S. McCormick, Mgr. Detroit Sales District; R. C. Gertson, Industrial Field Sales Manager, Detroit District; E. G. Nutting, Technical Service; Industrial Representatives: R. J. Lang, R. S. Keen, D. Snelgrove (Detroit), B. Kumko (Grand Rapids), A. J. Medwedeff (Flint), John Harden (Toronto), John Komon (Windsor).
A complete line of electrocleaners along with Bufsol, a water soluble buffing compound remover; Ferlon, an alkaline rust remover; Nordall, a spray cleaner; and a number of chemical products for aluminum processing.
Refer to page 23.

National Association of Metal Finishers To Meet In Detroit

"Management Tools" is the theme of the 1959 convention and management seminar of the National Association of Metal Finishers to be held concurrently at the Hotel Statler, Detroit, from June 14 to June 16, with the A.E.S. convention and exposition. General Chairman Glenn H. Friedt, Jr., of United Platers, Inc., Detroit, describes this meeting as "the best yet" for the group.

The 3-day session begins with the usual business meetings on Sunday, June 14, and proceeds through Tuesday, June 16, featuring three top industry management experts. A prominent figure of the automotive industry will address members and friends at the final banquet on Tuesday evening.

Chairman Friedt announces that management seminar discussions will be "off-the-record" and will not be published other than in the association organ. The NAMF will also sponsor an exhibition booth at the 5th Industrial Finishing Exposition highlighting all kinds of finishes on metal products, committee projects and NAMF objectives and accomplishments.

The NAMF Program:

Sunday, June 14, 1959

9:30 a.m.-5:00 p.m.—*Foyer*
Registration.

9:30 a.m.-12 noon—*Bagley Room*
Annual Membership Meeting.

1:30 p.m.-5:00-p.m.—*Parlor F*
Board of Directors Meeting.

Monday, June 15, 1959

9:30 a.m.-5:00 p.m.—*Foyer*
Registration.

9:30 a.m.-11:00 a.m.—*Parlor F*
NAMF Local Secretaries and Reps. Meeting.

1:30 p.m.-5:00 p.m.—*Bagley Room*
1st Management Seminar: Speaker—Joseph H. Lackey, partner, William H. McCoy Co., Detroit. Topic: "Pension and Deferred Profit Sharing Plans for the Small Plating Shop."

Tuesday, June 16, 1959

9:30 a.m.-5:30 p.m.—*Foyer*
Registration.

10:00 a.m.-12 noon—*Bagley Room*
2nd Management Seminar: Speakers and Topics: John A. Patton, J. A. Patton Management Engineers, Inc., Chicago, "Wage Incentives for Small Businesses"; Lucas Miehl, Commercial Steel Treating Corp., Detroit, "Profit Sharing for Small Businesses."

2:00 p.m.-5:00 p.m.—*Bagley Room*
3rd Management Seminar: Panel Discussion, "Incentives vs. Profit Sharing." Participants: Lucas Miehl and John A. Patton.

6:15 p.m.-8:00 p.m.—*Entrance of Bagley Room*
Registration.

7:00 p.m.-8:00 p.m.—*Bagley Room*
Reception.

8:00 p.m.-9:30 p.m.—
Banquet.

POST CONVENTION PROGRAM

Wednesday, June 17, 1959

8:30 a.m.-10:00 a.m.—
Breakfast Meeting, Directors National Assn. of Metal Finishers and Metal Finishing Suppliers' Assn.

1:45 p.m.-5:30 p.m.—
Plant Visitation sponsored by Plating Institute of Michigan, NAMF; visiting Michigan Chrome and Chemical Co.; United Platers Inc., and Chemical Processing, Inc.; leave Statler Hotel by bus, 2:00 p.m. (by ticket only).

For further information write or call the Executive Secretary, Peter Kovatis, 60 Bently Rd., Cedar Grove, N. J. PIlgrim 6-7597.

George W. Taylor
NAMF President

Glenn A. Friedt, Jr.
NAMF Convention Chairman

P. Peter Kovatis
NAMF Secretary

Better Buffing Thru Better Buff Design

By Stanley P. Sax, *American Buff Co., Chicago, Ill.*

The author graduated with high honors from the University of Wisconsin with a B.A. degree in Industrial Psychology and was elected to Phi Beta Kappa and Phi Kappa Phi fraternities. At this time, he also received the Wisconsin Scholar Award and was an instructor of Industrial Psychology in the University of Wisconsin Graduate School.

During World War II Mr. Sax started in the Army as an infantry private and is now a major in the Reserve Corps of Engineers. He joined the American Buff Co. in 1948 as a sales engineer in Detroit, and is executive vice president in charge of marketing. He is a member of the American Society of Abrasives and the American Electroplaters' Society.

THERE are many tools designed to do a job of buffing. Each has its place and can do certain things. But many have drawbacks of varying significance due to improper or faulty design. A recent survey showed 81% of the companies studied could improve their production rate, quality of finish, or reduce rejects, merely by changing the buff tool. Numerous shops, both independent and captive, are using an older design that costs them more per finished part.

Historically, the evolution of buffs is one of time and labor saving, as well as a development to accomplish specific purposes. One of the best ways to understand the various characteristics of the many different types of buffs now on the market is to study them from an historical point of view.

Buffing, or abrading metal to make it smooth and bright, is an ancient art dating back beyond recorded history. Early metal work, such as Roman armor, metal mirrors, and shiny artifacts were burnished and not polished with abrasive of the kind later employed. The process was slow and laborious. Putting a polish on an object is accomplished by reducing a rough surface to a smooth one. However, even on a surface which is relatively smooth, scratches exist. Refining the polish of an object, the process known as "coloring," consists of reducing these scratches to finer and finer scratches, so that the light-reflecting ability of the surface is increased.

In the old days, buffalo, or wild ox hide, was used to buff an article. The treatment was performed by hand. First, the article was roughed off with such abrasive substances as were available at that time. Then the final luster was imparted by buffing and burnishing. The term "buffing" is of French origin. It comes from the word "buffe" which means buffalo, or wild ox. In the past fifty years the main historical factor leading to modification in buff design has been the increasing complexity of contours to be finished and increasing automation in buffing. The transition from hand machines to semi-automatics and automatic buffing machinery, with their increased pressures, increased dwell time, and decreased rest time, has led to the need and development of better ventilated buffs. To a great degree, during this period, the evolutionary trend has been that solid cloth buffs have given way to buffs with various types of composition centers

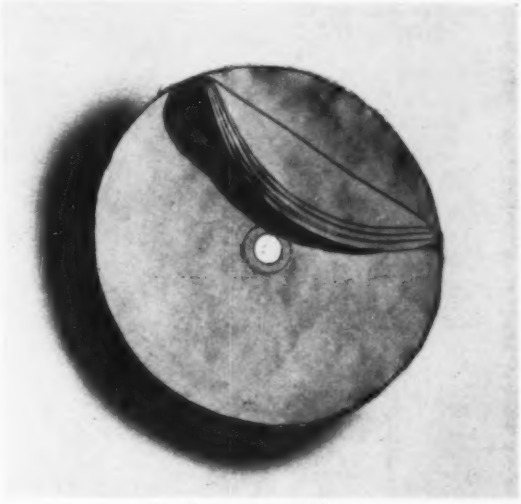


Fig. 1. Loose Buff.

(cardboard and cloth), to steel center buffs, both removable and permanent, and to centerless buffs.

Such things as the sequence of grinding, polishing, and buffing, and specific recommendations regarding speed, types of abrasives, and finishes, flowing the metal, cutting the metal, and many other subjects, will not be covered by this article. What it will be concerned with is better buffing through better buff design.

Conventional Buffs

With solid cloth buffs, variation in sewing, or the lack of it, determines how the buff is used. Unsewed discs and full disc buffs (Fig. 1), sewed around the arbor hole once for ease in mounting on shafts, are used for "coloring." Circular discs of cloth are cut from rolls of sheeting and assembled frequently in 18 or 20 ply to form a buff section. Discs are turned, so that the threads of the material lie in different directions every two plies. This permits the buff to wear evenly and avoids a square shape after being put into use. This buff has a uniform face that will not catch irregular surfaces. It is used primarily on small parts.

Sewed buffs (Fig. 2) are used for "cutting." The closer sewings result in more cut for harder metals and for buffing out deeper scratches and other imperfections. In general, there is less conformity to contours with sewed buffs. Concentric sewing results in more or less perfect density control when the buff is initially put to use. Each section, however, becomes harder as it wears closer to the sewing, and softer after wear causes the sewing to break through.

Spiral sewing results in a more uniform density. Square sewing produces pockets that help hold more buffing compound. Radial, sometimes called sunray sewing, and radial arc sewing, also form pockets designed to hold compound. Tangent, parallel, ripple, zig-zag, cantilever, and petal sewing are used for similar reasons.

Pieced buffs can be made in any of the sewings. Pieces of material are laid out on a large table. Layers are built up and sewed together, frequently in $\frac{3}{8}$" thicknesses. They are generally classified as colored, unbleached, bleached, or mixed. Bleached buffs are a bit stiffer and are used for faster cutting operations. For appearance and ease of manufacturing, full disc covers of relatively good quality are generally used. Frequently, the additional cost of extra labor involved in assembling the pieced buff negates the price advantages of this cheaper, less uniform material. Materials especially to be avoided in pieced constructions, except for special purposes, are ticking, denim, duck, pique, shade cloth, and toweling. Pieced buffs are not as well balanced as full disc buffs. The material is not on the bias and the buffs are not ventilated. Since pieced buffs are usually sold by the pound, it is helpful to refer to a weight table, when wishing price comparisons (Table I).

Different cloths are used to accomplish different purposes. The industry has moved from the use of unspecified pieced goods and inferior seconds, sorts,

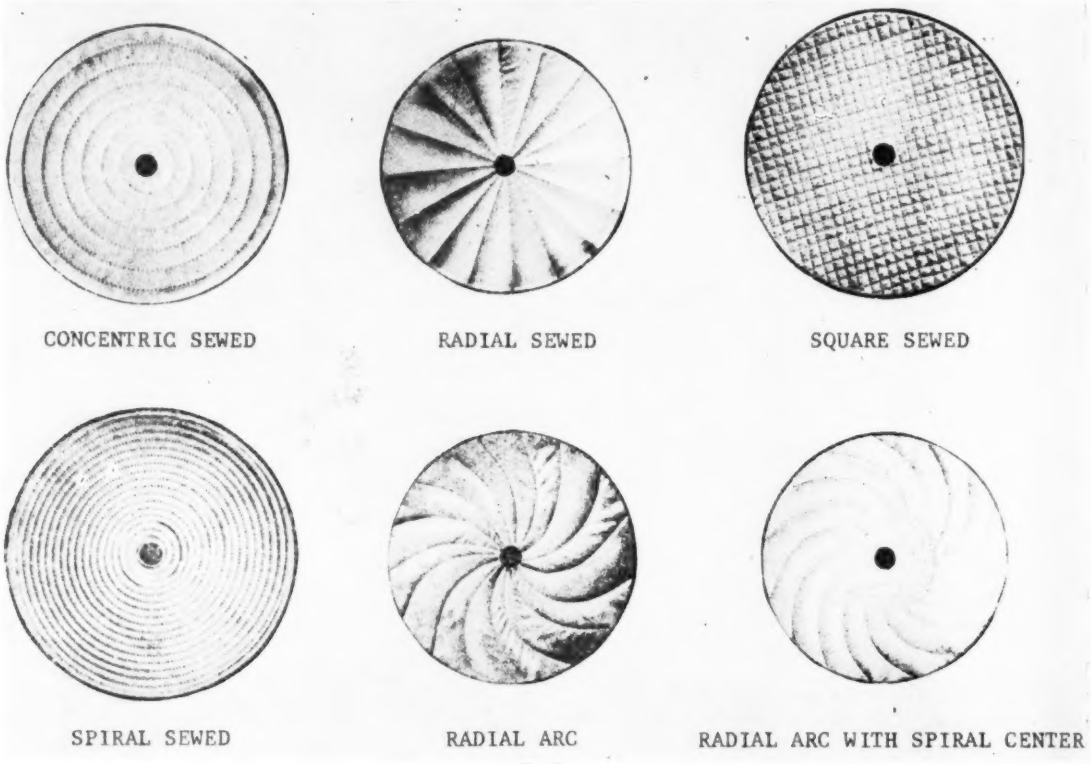


Fig. 2.

TABLE I

Approximate Weight Table — Spiral Sewed Pieced Buffs

Diameter	REGULAR Approx. ¼" Thick		HEAVY Approx. 5/16" Thick		EXTRA HEAVY Approx. ⅜" Thick	
	Lbs. Per 100 Sections	Sections Per 100 Lbs.	Lbs. Per 100 Sections	Sections Per 100 Lbs.	Lbs. Per 100 Sections	Sections Per 100 Lbs.
4"	7.4	1351	8.2	1220	11.1	900
5"	11.5	870	12.8	781	17.3	578
6"	16.6	602	18.4	543	24.9	401
7"	22.1	452	25.0	400	33.0	303
8"	29.4	340	32.7	306	44.1	227
9"	36.5	274	41.3	242	54.8	182
10"	46.0	217	51.0	196	69.0	145
11"	55.6	180	61.7	162	83.4	119
12"	66.3	151	73.5	136	99.5	100
13"	77.7	129	86.2	116	116.6	86
14"	90.2	111	100.0	100	135.3	74
15"	103.5	97	114.8	87	155.3	64
16"	117.7	85	130.6	77	176.6	57
17"	132.9	76	147.4	68	199.4	50
18"	149.0	67	165.3	60	223.5	45
19"	166.1	60	184.2	54	249.0	40
20"	184.0	54	204.1	49	276.0	36
21"	202.9	49	225.0	44	304.4	33
22"	222.6	45	246.9	40	333.9	29
23"	243.4	41	269.9	37	365.1	27
24"	265.2	38	294.1	34	397.8	25

culls, and reject low-count, light-weight material to uniform, specific high count, heavy weight material and has increased the use of sizing and stiffening.

TABLE II

Thread Count and Weight of Cloth

Warp (lengthwise)	Filler (crosswise)	Cloth weight (Linear yards per lb. of 40" wide material)
48	44	4.85
64	68	3.15
64	68	3.50
68	76	2.93
80	80	4.00
80	92	3.50
86	93	2.60
86	93	2.50
86	93 Yellow treated (or maize)	

The 86/93-2.50, 86/93-2.60, and 64/68-3.15 are the most commonly used. It will be noticed that the lower weight numbers represent heavier material as the fewer yards per lb., the heavier the material. The lower thread count and lighter weight materials are used for softer metals and plastics, and for light cut and color. The closer woven, heavier weight and stiffer materials are used for cutting operations.

Domet flannel (with nap on both sides) and Canton Flannel (nap on one side and twill on the other) are used where the other materials tend to scratch, or fail to produce a high enough luster. Canton flannel is available in 6-oz., 8-oz., 10-oz., and 12-oz. weights.

Wool buffs, made of carefully selected woven material, are used on plastics, soft metals, and on sterling silver, where they help prevent tarnishing. Russet (bark-tanned) sheepskin and white alum (alum-tanned) sheepskin are used for metals that contain lead, to prevent surface drag or smear. Russet is used for cut and alum for color.

One item the buff manufacturer must control to insure good performance of his buff is the strength of the material used in the buff. In any thread count, or any weight material, the strength varies tremendously. This strength can and should be tested and material shipments rejected, if they do not come up to standard. The reasons for strength variation within the same thread count and weight are variations in quality and staple length of the raw cotton and methods of spinning the yarn. Other factors are the size of the yarn and the treatment with starch or resin during weaving of the material.

The folded buff is available as a double fold, usually called a pocket buff, or as a triple fold, usually called a super-pocket buff. The folded buff has been in use for many years. It is run one way to cut, the other way to color. It consists of circles of cloth folded two times to form a quarter circle resulting in a "regular-pocket" buff (18 ply), or three times to form eighths of a circle to constitute a "super-pocket" (34 ply). The segments are laid to form a circle with each segment overlapping the previous segment half way. They are sewed around the arbor hole and part way to the periphery. The folds form pockets which hold compound, and flex for contour-following ability. They run a bit cooler than other type buffs; however, they share three basic design deficiencies with full-disc, pieced buffs, namely: (1) lack of center ventilation, (2) tendency to fray out; and (3) waste of material in the unused center. The triple fold, or super-pocket buff, is denser and, therefore, produces more cut than the regular pocket buff.

Packed buffs are produced by inserting small discs between the plies of material which, naturally, causes softening of buff face. Any number of discs may be used, depending on the softness desired. The same spacer principle is used between buff sections to achieve softness and flexibility.

Buffs designed for threaded, tapered spindles require a hardening of the center. This is usually accomplished by shellac. Additional center reinforcing is possible by the application of leather discs to both sides of the buff. This is followed by an additional hardening process. Lead cores poured into the center of the buff accomplish the same purpose. These tapered spindles in smaller diameters 2-12 inches) are used in the jewelry industry.

Polishing wheels are usually made of conventional buff sections glued or cemented together. The buffs may be made of various types of cloth, canvas, or sheepskin discs. When wheels are made of cloth sections, canvas discs are usually cemented to the sides to protect the sewing, and to keep the walls from breaking down and the wheel becoming mushroom shaped. Solid, rather than sectional wheels are made of wool felt, bull neck, walrus hide, etc. Grain is applied to the surface with glue or cement. A head is thus formed, which is struck with a pipe to form cracks on the polishing surface. A degree of resiliency is developed thereby, which allows the wheel to flatten and make contact with the work. The use of polishing wheels results frequently in the lowest cost method of polishing. Buff sections used to make up polishing wheels are usually spiral or square sewed. The spiral is the least expensive while the square sewed is the most uniform.

A streak-proof, or non-ridge, wheel is made by alternately inserting pie-shape segments. This and other constructions are used to break up the straight lines caused by ordinary buff sections.

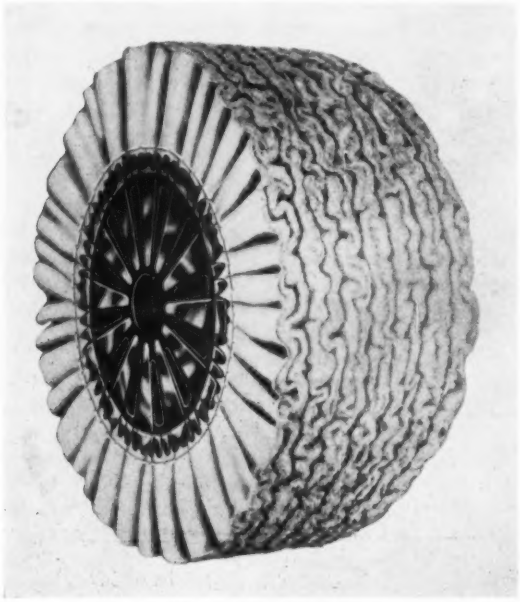


Fig. 3. Puckered Buff.

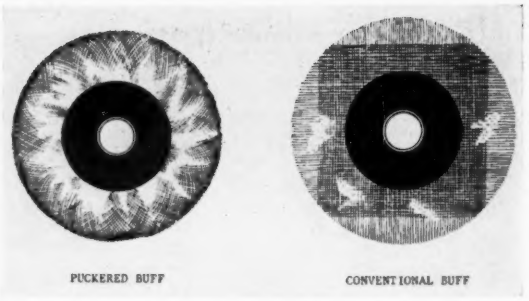


Fig. 4. Puckered buff vs. conventional buff. Thread configurations of puckered buffs prevent fraying by interstitching warp and filler threads. It increases buffing efficiency by exposing all thread ends to surface being buffed.

Puckered Buffs

A great advance in the buff manufacturing art was the development of the puckered buff. (Fig. 3) The threads form an X at the periphery. Each is held at a 45 degree angle by every other crossthread. This tends to overcome the disadavantages of fraying or raveling. An easy test of the advantages of the puckered buff is to hold a wheel rake against a conventional buff. A cloud of threads will fly off. Hold the rake against a puckered buff (made with material on the bias) and threads will not fly off (Fig. 4). Puckered construction also shows a substantial saving in composition. Furthermore, due to manufacturing methods, cloth down to the arbor hole is no longer necessary.

These buffs are produced by cutting the 40″ rolls of material at a 45 degree angle into strips and sewing these strips to form continuous rolls of biased fabric. The fabric is wrapped around a split drum with a channel in the split. A loop of piano wire, or steel blades in an Iris machine are among the methods used to pull the cloth to the desired inside diameter within the channel. This results in the puckered nature of the buff. A continuous metal ring, piece of string, or staples may be used to hold the cloth at the buff's inside diameter.

Cardboard discs may be inserted to adapt the center of the buff to the shaft. Cloth covers are then sewed on to keep the cardboards from falling out when the buffs are mounted on a shaft.

Greater production of bright metal parts required greater use of automatic machinery, greater speeds, pressures, and dwell time, with less index or rest time. This caused more heat build-up in the buff wheels. The puckered, or ruffled characteristics of these new type buffs allow them to run cooler than the older types. However, operating conditions caused even these buffs to run too hot. Drying out of the cloth, scorching, and actual bursting into flames sometimes resulted.

To alleviate this fire hazard, air holes may be drilled into the centers. In addition, cardboard flutes are sewed on to direct this air flow, or cardboard centers are pressed thinner with ridges to guide the air. These steps all help.

High speed, high production buffing took another giant step forward with the introduction of the steel

center ventilated puckered buff. Steel clinch teeth are often used to clinch the cloth (Fig. 5). The buff has a metal plate, perforated for ventilation and embossed for strength, with lips that fit both sides of the steel teeth. This constitutes a center which is discarded with the buff. Metal inserts with lips on one side only may be salvaged and re-used. Properly designed, these inserts snap in place and hold onto the buff unless forcibly pushed out by hand. Those that are poorly designed fall out during handling. Some must be inserted with a press and knocked out with a hammer.

Another center, which is still in use, is the welded double plate. The two plates must be aligned carefully and spot welded many times. Still another frequently used metal center is very light in weight and involves the use of staples.

Industry standards for sizes of buff centers are 3", 5", 7" or 9". The proper size for a specific purpose depends on how far down the buff can be used before (1) the surface speed reduces to a point of inefficiency or, (2) flexibility reduces to a point of inability to follow contours. This increasing rigidity is due partly to the fact that most buffs are designed with as much material in the inside diameter as they have at the outside diameter.

Other things being equal, the smaller the inside diameter, the larger the outside diameter, and the greater the density that can be used, the better. This will result in fewer changeovers, less labor and loss of production due to downtime and, of course, less machinery requirements and other costs. The buff assembly charge remains the same, and the only additional cost is material.

Density variations may be accomplished by greater

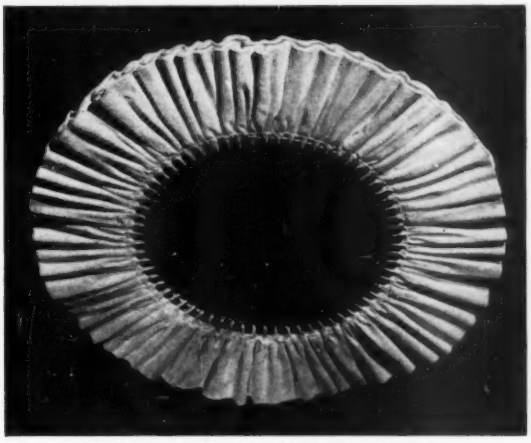


Fig. 5. Steel clinch ring buff with open center.

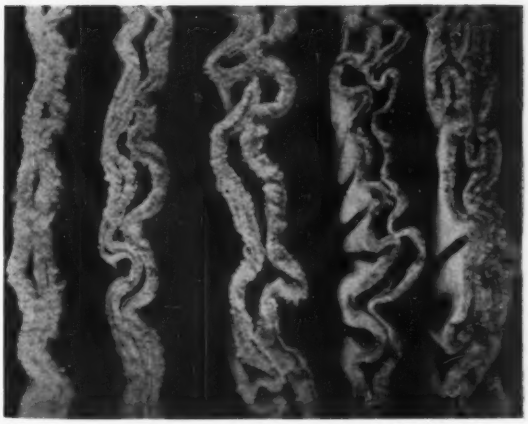


Fig. 6. Face variations — closed face and spiral buffs (left to right: 9, 2, 4, 6 and spiral).

or lesser amounts of cloth in the wheel. Puckered buffs are rated by numbers. The higher the number, the greater the cloth content, buff density, and pucker of face (Fig. 6). Higher density of the buff increases cut. Increased pucker reduces streaking.

In the open face construction, there is less tendency to load, pack, clog, and form ridges that streak, because the plies do not lie as close together as they do in the closed face. However, the open face design buff is frequently insufficiently dense. In order to do the best buffing job, the optimum face design must be combined with optimum density, pressure, speed, power to maintain speed, angle to the part, cloth (strength and compound absorption ability), ventilation, contour following ability, and other design features.

In the open face design, material may be wound singly, or in groups of two, three, four or more plies. The number of plies times the number of winds equals the total number of plies. While the amount of material varies according to plies, it also varies according to the amount of shirring, the count, weight, and treatment of cloth. Open face buffs may be straight wound or spiral wound. There is a certain corkscrew, or cross-cutting action in the spiral wound buff design that helps overcome streaking.

A feature which frequently achieves improved buffing results is the pleated design. Cloth is permanently knife creased, so that it presents more changed angles of material to the surface to be finished. This results in less tendency to streak and better coloring characteristics. If properly constructed and suited to the job, better cutting is also achieved.

(To be concluded next month)

Rectifiers in the Electroplating Industry

II. STILL TANK PLATING

By George Schore, *Brucar Equip. & Supply Co., Brooklyn, N. Y.*

This is the second and concluding part of Mr. Schore's article. Part I appeared in the May issue.—*Ed.*

Nickel Plating

BRIGHT NICKEL:

THE most common type of plating operation and the one most widely used is bright nickel. Nickel is used directly on steel, for decorative finishing over copper, brass, copper on steel, or die castings, lead castings, etc. It is used in plating for the automotive industry, silver holloware, utensils, jewelry, etc. There are many proprietary patented solutions used in the industry. In all applications, however, current is in the order of 25-45 amp./ft.^{2} Power has been least understood of all the variables in the bright nickel cycle. Specifications must always include a 5% ripple factor for units specified for use in bright nickel plating, so that laminated or dull plate may be avoided.

In automatic plating installations estimation of the power supply may be made by determining approximate area per rack, number of racks in the nickel plating cycle at full load; use 45 amp./ft.^{2} as a mean figure for current density, allow a safety factor of 20% so that eventualities may be covered. This method is rough at best and practical considerations will be the determining factor in reaching a final figure of required current. For instance, the center of a rack will have a lower current density than the top, bottom and sides; the same will apply on irregular-shaped articles to points which are hidden or will require deeper throw. General practice has been the use of 6 volt units with full-control, either self-contained or remote. However, there are many installations using 9 volt rectifiers.

Recently, bright nickel solutions with increased leveling, and allowing for the use of higher current densities with or without the use of air agitation, have become available. With the use of these baths, 9 volts minimum are required; it is often desirable to use 12 volts d.c. It has been possible to use 3 to 4 amperes per gallon of solution in some installations. Physical size and the area possible to be plated at one time will, of course, dictate amperage requirements. Full-control, low-ripple units are desirable.

The more difficult decision to be reached is what power is to be specified on hand-operated tanks. Sizes vary so greatly in the industry that amperage per gallon may be the best method of designating power. It must be kept in mind that ordinary operations would require 6 volt units. However, for die-castings, silver holloware, or other types of plating, where deep throw is the factor, 9 volt units may be necessary. A general figure on small tanks of 1 ampere per gallon plus a 10% safety factor will cover power requirements in bright nickel. To determine the amount of gallons in the bath, merely multiply the length by the width by the depth in feet and multiply by 7.5. Most common of the small tank sizes would be 400-500 gallons which as mentioned above will require a 500 ampere unit. When 700 gallon to 900 gallon baths are used a rectifier of 1000 amperes should be specified. In all cases, where high current densities are required and can be used because of the nature or shape of the article, higher amperage may be specified. The same general principle will hold for semi-automatic installations. Using a factor of about 1½ amperes per gallon will generally give sufficient current capacity.

DULL NICKEL:

Dull white nickel plating is not as critical to power requirements as most of the other types of plating. Since plating in the regular Watts bath will not exceed 15 to 30 amp./ft.^{2} when used warm and concentrated, and will generally be in the order of 5 to 10 amp./ft.^{2} in the regular bath, rectifiers using full-control from 0 to 6 volts should be specified. In this type of plating, low voltage is most commonly use. Ripple, though not a determining factor, since the plate is dull white, will only be critical where a high concentration of impurity is present in the bath. It is wise, therefore, to purchase full wave rectifiers having 5% ripple. Units should be specified with full or remote control only. To approximate power requirements, estimate ½ to 1 ampere per gallon for a concentrated Watts bath and ½ ampere per gallon for the dilute bath.

BLACK NICKEL:

In general, all conditions as outlined above for the dilute Watts white nickel bath will prevail. A full

wave rectifier with five per cent ripple specified as either full-control or remote-control should be used. ½ ampere per gallon should be approximated as necessary power for this operation.

Copper Plating

BRIGHT, HIGH SPEED COPPER:

Recent developments in bright, high-speed copper plating have made necessary the use of low ripple rectifiers with high capacity. The voltage requirements are low since seldom does one use above 3 volts on these solutions. Therefore, units rated from 0 to 6 volts output should be specified. It is not uncommon that 1 volt or slightly less is used in controlling the rate of deposition, especially where small parts or areas are being plated. The most common uses of the bath are for buffing operations and as undercoat for nickel on die-castings. Therefore, only full-control type rectifiers must be specified; and approximately 1 to 1½ amperes per gallon of solutions may be specified.

ROCHELLE COPPER:

There are still many baths of this type in operation. In addition, bright baths using rochelle salts as additive are not uncommon in plating installations since, unlike the high speed baths, they do not require a copper strike. These baths are operated at a low voltage, e.g., between 1 and 3. Therefore, only full-control type units must be specified; voltage rating of the rectifier should be 0-6 volts d.c. Amperage requirements of baths of this type, with their lower efficiency, will be roughly ½ to ¾ ampere per gallon of solution. It is not essential, but full wave rectifiers should be specified: this is especially true of the low efficiency bright copper baths.

ACID COPPER:

The acid copper bath is used for three main applications today: for plating on non-metallics, in electroforming where heavy deposits are required for reproductive purposes, and in areas where waste disposal, with the expenses of disposing of cyanide, makes its use practical in plating prior to bright nickel and chromium plating. These baths are highly efficient and, when additives are used in the solution, extremely high current densities may be reached. In uses such as electrotyping, gravure, and electroforming, current densities between 75 and 200 amp./ft.^{2} are not uncommon. Likewise, with the newer copper fluoborate bath, very high current densities are common, e.g., 125-300 amp./ft.^{2} It will, therefore, be necessary to analyze each specific installation for power requirements. However, units having full-control with ratings from 0-6 volts d.c. should be specified. It is wise to insist on low-ripple full-wave units for rectifiers operating these solutions, since the reaction of additives to the bath may be adversely affected by high ripple rectifiers.

Barrel plating in acid, though not very common, is used in plating on plastics mainly. Units should be specified of a minimum 9 volt maximum voltage. In general, a 14" x 36" cylinder will require approximately 200-300 amperes, depending on load size.

Zinc and Cadmium Plating

Since the Korean War, zinc plating with subsequent conversion coatings has made great strides in decorative finishing as a substitute for chromium plate. The economic advantages of using a zinc plate on hardware parts has also made itself felt. Brighteners and conversion coatings have not only assured uniform, brilliant plate but also decoratively acceptable finishes with good corrosion resistance. Little has been done to determine ripple factor effect on the recently developed bright zinc baths. Since impurities, for the most part, are removed by means of sulfur-bearing compounds incorporated in the addition agents or added separately, it would seem that ripple would have little effect on the deposit. Logically, with higher ripple, it might appear that the anode surface would be aided by its presence. Practically, we have not learned any effect, good or bad, with its use; in field applications both half-wave and full-wave rectifiers are giving equally good results. Economics in purchasing equipment and comparisons of power factor and efficiency may be the deciding factor as to which type of rectifier to supply. In practice, current densities of approximately 45 amp./ft.^{2} may be reached in a hand cycle, while overall current density in an automatic cycle will probably approach closer to 35 amp./ft.^{2} To determine current requirements in automatic plating, a figure of 35 amp./ft.^{2} of area in the tank will provide adequate power for most installations. The units are generally purchased at 9 volts d.c.; only full-control units should be specified; saturable reactor stepless control between 2 and 9 volts would exemplify optimum control units. In hand cycles, it is most difficult to specify power requirements; based on gallon capacity of the tank, a factor such as twice the tank volume may be used. For hand cycles it is most important that full-control units with 9 volts d.c. power be specified.

In recent years, because of economic factors, cadmium plating is being more and more displaced by zinc. However, there are many practical needs for cadmium for which there can be no replacement. Recent developments in brightening agents have improved the throwing power of cadmium to where it closely approaches zinc. On castings, for instance, the covering power of cadmium makes it an excellent practical tool. The greatest use of cadmium today would probably be for soldering purposes on parts such as radio and television chassis, etc. Ripple factor plays little part in producing good cadmium deposits, it is not uncommon to see half-wave rectifiers in installations for cadmium plating. Current densities are much lower than for zinc plating; in general, a mean figure of 15 to 20 amp./ft.^{2} may be used with 6 volts d.c. power. Rectifiers should be of the full-control type since it is not uncommon to use 2 to 2½ volts in this process.

Brass and Bronze Plating

Brass plating has become very popular in decorative finishing during the past few years. In general, most brass plating for this finish is carried out as a flash finish over bright nickel. A flash plate of approximately 15 seconds to one minute will suffice for a

good uniform finish which may be chrome dipped and lacquered. Small power units are necessary for this application. Even in automatic cycles using flash brass, rectifiers are seldom above 250 ampere capacity; full-control units must be specified for these operations. Ripple factor is not critical and single phase units are not uncommon for this operation. Six volts d.c. are ample. Temperature and/or voltage may be used to vary the color of the brass finish.

Where brass plating is used for full finish as in lamps, etc., when not using the newly developed bright brass baths, a solution high in copper and using zinc for color is practical. It is difficult to place a figure on power requirements because of the varied types of baths now in use; a figure of ½ to ¾ amperes per gallon may be generally specified, with 6 volts d.c. pressure. Units must have full-control. Ripple factor effects have not been studied on these solutions; practice as in copper baths of the old Rochelle type would indicate that half-wave units are currently being used.

TIN-BRONZE:

Another recent development in electroplating is the use of tin-bronze. Finishes simulating gold and going through colors from bronze to white are being produced with these solutions. The leveling advantages of at least one of these processes made it practical during the nickel shortage; its superior throw and covering power have kept many of these installations intact even with the easing of the nickel supply. The use of tin-bronze as undercoat for die-castings and as a replacement for copper has been proven though, economically, its value has often been negated. Control of the bath is relatively simple and its use is increasing daily. Many ornamental items are being replaced with tin-bronze finish for gold, etc. Current densities are fairly high in any of the tin-bronze processes: a general figure of about 1 to 1½ amperes per gallon may be specified, using 6 volts d.c. power. Only full wave rectifiers with full control should be used for this application.

Silver Plating

Silver plating is being used more extensively today for electronic applications. In most installations of this type, bright silver is used as finish coat or as undercoat for gold, rhodium, or palladium. Ripple factor studies on these new baths have not been made. However, it may be pointed out that both single phase units with high ripple (43%) and three phase units with low ripple (5%) are currently being used with equally good results. The bright silver baths are commonly used between 10 and 15 amp./ft.^{2} though, with increased silver concentration and agitation, current densities of 60 amp./ft.^{2} and higher are achieved in practice. The advantage of these baths over the old type silver is that no scratch brushing or hand operations are necessary for final gold, rhodium, or palladium finish. Rectifiers may be specified using a figure of approximately ½ ampere per gallon for bright silver, with d.c. voltage of 6. Only full-control units should be specified. It is not to be overlooked that, in decorative finishing, bright silver plating is replacing the old type baths because of speed of deposition and elimination of scratch brushing after plating. Agitation is essential with these baths.

In regular, dull-white silver-plating, current densities of between 2 and 5 amp./ft.^{2} are used, depending on concentration and agitation of the solution. Ripple factor is unimportant since single phase units and three phase units have been commonly used in this operation. Six volts d.c. are required with full control. In noting current densities used, it will be seen that small power requirements exist for this operation. An approximate figure of ¼ ampere per gallon will generally be adequate.

Gold Plating

Decorative flash gold plating was, until the advances in vacuum metalizing, the most common finish in jewelry plating. Nickel was generally used as undercoat and either a brass flash or pre-plate strike was followed by a suitable gold finish. Most installations were and still are comparatively small, e.g., between 5 and 25 gallons, because of the cost of gold. It is most difficult to specify power, other than to say the unit should be full-control. Single and three phase installations exist with and without rheostat control. It is advantageous to specify 9 volts d.c. with amperage as required. Flash gold is plated between 15 and 35 amp./ft.^{2}

With the increased manufacture of electronic equipment, gold plating has found greater application. Gold over silver and gold deposits directly to 0.0002-0.0003, also heavy gold plate between 0.001-0.003, are not uncommon. Recent advances in the technique of heavy, bright gold plating have made the use of this precious metal more easily controlled and, with the high efficiency of the bath and speed of deposit possible, more economical. In practice, the baths are plated between 3 to 7½ amp./ft.^{2} Again, ripple factor seems unimportant since single phase units are most common to these installations. Approximate power requirements can be estimated from the above figures. The 6 volt d.c. units must be purchased with full-control.

Tin Plating

The use of potassium salts in alkaline tin solutions have made possible the use of high current densities. Tin, like zinc and cadmium, does not seem to be critical to ripple factor of the power supply. Installations using both three phase half-wave and full-wave rectifiers are operating equally well. Potassium formulations allow for deposition rates in excess of 100 amp./ft.^{2} Most industrial installations approximate 20-50 amp./ft.^{2} The sodium formulation is seldom used in practice today because of its limited current density application. Plating in this bath is done between 15 and 30 amp./ft.^{2} Tin-zinc will tend to fall into this category also. To arrive at practical power supply, the cadmium and tin-zinc baths may use between 1 and 1½ amperes per gallon of solution: the potassium bath will use between 1½ and 3 amperes per gallon. A 9 volt d.c. rectifier with at least half-control should be specified with these solutions. In tin-zinc full-control should be used.

Chromium Plating

Many power units in a chromium plating installation have been undersized. The low efficiency and high power requirements of this bath tend to give more difficulty than any other solution. Ripple factor has a decided influence on chromium deposits; it has been shown that only full-wave rectifiers should be specified. Decorative deposits, in general, will require between 75 and 150 amp./ft.^{2} of area; hard chromium is plated between 125 and 700 amp./ft.^{2} In all cases rectifiers must be full-control. Decorative plating baths will require approximately 4 to 5 amperes per gallon; hard chromium may require even higher amperage per gallon. Power should be specified at least at 9 volt d.c.; often 12 volts must be used.

Anodizing

SULFURIC ACID ANODIZING:

The most common type of anodic coating on aluminum is that obtained in the sulfuric acid bath. This bath will produce, in shorter times, coatings which will take dyes most easily and uniformly. Baths are operated between 70° and 90°F. In general, organic dyes are used before the coatings are sealed. Time of deposition will vary with color of coating required; e.g., black will require 40 minutes to 1 hour; gold 15 to 30 minutes. Sulfuric acid anodizing is carried out between 10 and 25 amp./ft.^{2} Voltage will vary not only with conditions of anodizing but also with alloy to be coated. Anodizing, in general, as carried out between 12 and 24 volts d.c. Most installations today, because of the new aluminum alloys, are being specified at 24 volts d.c. Minimum requirements should be 18 volts. It is difficult to specify amperage per gallon since work, unlike regular plating operations, need not face a cathode, necessarily. A mean figure of 12 amp./ft.^{2} of work load will generally fulfill power requirements. Rectifiers must be purchased with full-control, since voltage is started low and stepped up as the film builds up. Full-wave rectifiers generally are used for this application.

CHROMIC ACID ANODIZING:

Where assembled parts are to be anodized, especially when one part envelopes another, chromic acid anodizing must be carried out. If copper-bearing alloys are used, the chromic acid bath cannot be employed. There is still limited use of the chromic acid solution being carried out industrially; seldom is there any practical decorative use of this solution. The parts are anodized between 2 and 5 amp./ft.^{2} Voltage must be stepped up as the film builds up. Generally, this is done in 8 volt steps on a hand cycle allowing 15 seconds to 1 minute between each step. Final d.c. voltage is 40. Rectifiers must be the full-control type; at least 40 volts d.c. should be specified with most modern installations using 48 volts d.c. Full-wave rectifiers are always used in these installations.

HARD COATING OF ALUMINUM:

Recently a new tool has been given to the metal finishing industry. By using "hard coat" anodizing, controlled thickness of film ensures hard, abrasion and corrosion resistant films far superior to any previously secured. Dyeing is possible with the coatings secured. In general, there are three techniques commonly used; two are quite similar in operation. The third is operated similiar to a chromic acid step programming cycle, though the steps are smaller and with greater frequency. It is first necessary to step the voltage up slowly in any process before applying fixed amperage to the item. High voltages in the range of 60 to 75 volt units are specified; amperages in the range of 20-45 amp./ft.^{2} are used. Refrigeration is a necessary part of the cycle. Only full-wave rectifiers are used in this operation. Seldom is a hand tap-switch used because the fine control necessary for this operation is not secured; a stepless type of control is most essential for proper film formation and best results. Germanium and silicon rectifiers have found wide use in this application because of increased efficiency.

HARD COATING OF MAGNESIUM:

With the need of abrasion and corrosion resistant metals for our missile program, increased use of anodized "hard coat" magnesium is being found. Two processes for coating magnesium have found limited use in this field. Anodizing of magnesium gives the most abrasion resistant type of coating for this light metal and its alloys. All the alloys may be treated. One process produces two types of coatings. The light green coatings approximately 0.0002" thick and the dark green about 0.001" thick. The heavier coatings are more abrasion resistant. Both a.c. and d.c. current may be used in this process; d.c. coatings have the advantage of requiring less time for equivalent thickness; no differences in coatings will result. A.c. power supplies may be installed using three phase systems with bars in the steel tank in the shape of a triangle. Areas must be somewhat uniform, though variations in sizes of parts processed at the same time have been carried out. The amperage of the systems is held constant with rise in voltages as film forms, until required time has elapsed, after which current is returned to zero. In some installations, titanium has been used for cathodes, making load size variations even greater. Single phase a.c. installations also exist. A main transformer with control of amperage is all that is necessary for this application. The tank is generally grounded in this anodizing method.

In d.c. operation, there is no limitation to the size or amount of pieces to be processed at one time. The tank may be used as cathode. Current is held constant for the duration of time required for coating desired; voltage is made to rise as film builds up; at end of cycle, the current is returned to zero. The rectifier must be stepless and automatic for this operation since it would be most difficult to manually keep current constant as required.

For the lighter coatings, 75 volt units are specified; for the heavier 110 to 125 volts are used since, with the aging of the solution, increased voltages are required to assure amperage required. Rectifiers are full-wave; here also germanium and silicon have found increased application.

An interesting operational fact about these coatings is that they need not be stripped should the parts either be processed wrong or machines after

anodizing. They are merely returned to the solution; the parts will not anodize until the voltage is reached required for further coating.

Electropolishing

STAINLESS STEEL:

The economic advantages of electropolishing stainless steel have long been apparent to industry. Further, parts can be polished where it is physically impossible to use a wheel. The operation of this cycle is comparatively simple; degreasing will almost always suffice as pretreatment for electropolishing. Parts are processed in a lead tank using lead cathodes and agitation. Since the solution has very poor throwing power, conforming cathodes must be used for deeper undercut parts. Though several patented processes call for 18 volt supplies, most installations are using 12 volts d.c. A figure of 4 to 7 amperes per gallon of solution will be sufficient, generally. Rectifiers should be full-wave with at least full tap-switch control. Where small parts are processed, half-control may not be sufficient for good processing.

ALUMINUM, BRASS, STEEL:

In processing these metals all basic facts of electropolishing stainless steel hold true. Because increased amperage is required over stainless, e.g., 5-10 amperes per gallon, an 18 volt unit should be specified. As outlined above, conforming anodes are required for deep recesses; full-wave rectification is used with at least full tap-switch control.

ELECTROLYTIC DEBURRING:

Electrolytic deburring is a refinement of electropolishing. Controlled removal of metal or burrs from parts may be accomplished. The general conditions, as outlined above for electropolishing, will apply with the use of high voltage, i.e. 18 volt units. A critical of this process appears to be ripple. Twelve phase rectifiers giving as low a ripple factor as possible will give optimum results. Full tap-switch control is minimum requirement; stepless control, of course, will assure best results.

Automatic Controls

Of the special controls in use in finishing, the oldest and most commonly used automatic control is automatic voltage stabilization. This control assures constant voltage, no matter what size load may be in the tank or how often this load size may be changed. It will assure, for instance, constant voltage on an automatic plating machine and will remain constant at beginning of cycle when parts are being loaded into machine and at end of cycle when parts are being unloaded. This control will suffice for all plating, operations where slight loss in total current, because of drop in amperage per square foot as machine is being loaded, is not critical.

AUTOMATIC CURRENT DENSITY:

As the name applies, automatic current density control is the refinement of automatic voltage. Amperage per square foot is constant no matter what the load size or how often changes are made. The above will only hold true in so far as the physical application within the bath is true. Current density control will, of course, be preferred in any plating operation. Its application in sulfuric acid anodizing has been proven practical recently with excellent results. A preset amperage per square foot is made on the unit, no matter how often following load sizes are changed. The amperage per square foot will remain constant. Best film results for dyeing are assured in this way.

AUTOMATIC CURRENT CONTROL:

Automatic current (total amperage within tank) has most often been used in sulfuric anodizing cycles. It has the disadvantage of requiring resetting the control with any change in load. The control may be used in plating operations where total amperage for a tank load is known. With the hard coats on aluminum becoming most popular, this control is finding increased usage. In magnesium anodizing, it is preferred over other types of control; in aluminum hard coat cycles, most consistent results appear to be a step programming to a film overvoltage point and switchover to automatic current. In at least two of the hard coat cycles, this procedure is giving optimum results.

STEP PROGRAMMING:

As an automatic control for both chromic acid and sulfuric acid hard coating, the step program has found wide use. As implied, the rectifier is automatically set so that definite voltage changes are made, with the voltage being held constant in the dwell stages until a presetting voltage is reached, after which the control is switched to either automatic current or voltage stabilization.

All the controls outlined, of course, are examples of what can be done; special applications of combinations of these controls are being carried out.

Though PR and interrupted current are not controls in the literal sense, they have found wide use in industry. With the use of periodic reverse, the parts are made cathode, then anode at preset times to secure better and more uniform deposits; also, to secure brighter deposits. Interrupted current merely works on the starter of the rectifier cutting it out for preset time intervals. Interrupted current is finding increased use in plating operations.

This paper has been written with the hope that general information, which is important to the newcomer and to the man beginning a new process, will become available. It is most difficult to write specifically, since each operation will vary with existing conditions. There has been no effort to discuss semiconductors, their application, stepless controls such as saturable core reactor, motor operated powerstat, etc., their advantages and disadvantages. It should be understood that, where rectifier is specifically mentioned in the paper, motor generators may be used. Power figures and general information of voltage requirements, etc. will prevail.

Dip Dyeing of Finishes for Vacuum Metalizing*

By Robert J. Perkel, *Jema-American, Inc., Newark, N. J.*

THE use of some form of colored top coat over vacuum metalized articles is the metalized finish in greatest demand today. An estimate that 80-90% of decorative applications are dyed is probably not an exaggeration. It is indeed surprising therefore, that little has been written about the proper use of this technique, its pitfalls and advantages.

The most suitable manner of utilizing color both for economy and light fastness, of course, would be to incorporate a dyestuff or, still better, a transparent pigment into the top coat finish. This method is indeed being successfully used by some concerns which are flow coating small parts that require very deep shades. For the majority of work however, this procedure does not produce uniform colors and dip dyeing is mandatory.

The dyeing of bulk plastics and coatings by the dip dye technique is akin to textile dyeing. In the dyeing of fibers we depend upon heat to aid penetration of the dye molecules, whereas in dip dyeing, a cold process, we use solvents to accomplish the same purpose. There are two main categories of dye-dip in use today. The older variety is a super-saturated dye concentrate which is used in conjunction with dye reducer. This type of dye usually has a sediment in the container. It is generally more economical to use but is more prone to non-uniform color, attack of the top coat finish and water spotting. The most uniform results are obtained with 'ready to use' dye solutions formulated quite differently and provided in perfectly clear, completely dispersed systems. Both types are currently being used successfully in many metalizing plants.

The Affinity of Dyestuffs

The affinity of a dyestuff for a surface depends upon a multiplicity of factors. By affinity we refer to the depth of color produced under a given set of conditions. Among a group of dyestuffs, other factors being equal, one observes a significant difference in color development on any top coat finish. This difference in affinity is related to the forces of attraction between dyestuff and surface and hence to the chemical composition of both components.

A similar result is produced if one varies the composition of the top coat and uses one dyestuff. Both the depth and shade vary with top coat composition, a factor important to bear in mind when color matching. In general polyvinyl chloride finishes have poor affinity for dyestuffs, urea-alkyd compositions readily accept dyestuffs, and other coatings lie somewhere in between. Most coatings can be dye dipped however, if the proper dyestuff is chosen.

Often, one desires to obtain very deep shades, such as "Christmas" colors. Increasing the dip time is usually not the answer to this problem for in many instances the dye solutions will attack the top coat before sufficient color has been adsorbed. It is apparent that if one chooses a top coat with very high dye affinity he can easily obtain deep colors in normal dye cycles.

Other factors that affect dye affinity are the temperature and percentage of active solvents in the dye bath. With thermosetting finishes, of course, the extent of cure is important. Amine or amino resin modified epoxy finishes are most sensitive to cure times. One minute at baking temperature often produces a highly cross-linked finish impervious to dye. For these systems, lowering the temperature of the pre-bake prior to dyeing usually produces dye control and uniformity.

The One Color Dye System

Many applications specify an exact color. This has necessitated the practice of using more than one dyestuff in dye solutions, the only way to obtain exact color matches. Mixing of colors is common with both dye suppliers and users. If the affinity of the two or more dyestuffs in solution vary, it is understandable

*Presented at the Society of Vacuum Coaters Technical Conference, Detroit (1958).

that one may be preferentially absorbed and consequently the color of the dye will shift (or drift) as the solution is exhausted. Furthermore, if the solubility of the dyestuffs vary, precipitation of the less soluble dye occurs as active solvents evaporate, again resulting in color shift. Other reasons for the rejection of multicolor dyes will become apparent in the course of the discussion.

It has been possible, by judicious choice of dyestuffs, to produce a line of dye solutions composed of a fairly complete spectrum of colors. We have achieved in this manner a dye solution yielding consistently uniform color. It is therefore important for the metalizers to specify "one color" dyes wherever possible.

Light Fastness on Dyed Top Coats

At the present time none of the dyestuffs used to dye metalizing top coats can be recommended for continuous exterior exposure. For indoors and intermittent exterior exposure many dyestuffs are usable. Exposure data on metalized samples indicate that slight change after 15-20 hours in direct sunlight must be considered excellent fastness. We observe that light fastness is also a function of top coat composition. A dye that is fugitive in one top coat may be quite fast in another. Where fastness is a prime consideration, the top coat should be submitted to the manufacturer for evaluation of the suitability of any particular dye.

It is possible to prolong the fastness of dyes by overcoating dyed work with special clear top coats. The success of this procedure will depend upon the dye and the composition of the clear top coat, for the overcoat must absorb the wavelengths of light most effective in the fading of the dye in question. Generally, if light below approximately 250 milli-microns is removed, maximum protection is afforded. The advantage of this procedure, however, often does not justify the added expense.

When using top coats that are themselves affected by aging and light, such as polyvinyl chloride and phenolic finishes, color changes occur which are due to yellowing of the coating in addition to the dye fading.

The Effect of Baking Upon Dyestuffs

There exists widespread use of baking temperatures over 300°F., so, discussion of effect of heat upon dyestuff is warranted. Most important in dyed baking finishes is the phenomenon of sublimation. This is equivalent to a vaporization of the dye molecules under the influence of heat with concurrent loss of color. Sublimation results in considerable lighter colors after baking. Where combinations of dyes have been used we may observe color changes, in addition to loss of dye, if one dye is more prone to sublimation than are the others. Most dyes will sublimate when exposed to high temperature for long periods of time. No change after one hour at 300°F. is considered excellent sublimation resistance. The rate of sublimation is also affected by the nature of the top coat, (Fig. 1) but is not dependent upon the extent of cure of the coating before dyeing.

There are two other phenomena which manifest themselves in baked work. First, we occasionally observe an irreversible color change which appears to be produced strictly by the baking process. This is due to chemical action of the coating upon the dyestuff and is more apt to appear in baking finishes which contain catalysts. Second, is the phenomenon known as thermochronism. This is a reversible color change which is caused by raising the temperature of the dyestuff. When the sample has cooled down to room temperature, its original color is restored. When matching a color in a baking finish, it is therefore imperative to fully bake the finish and to examine it only after it has cooled.

Chemically Induced Changes in Dyes

The most frequently occurring chemically induced change in dyes is observed when we dye oxidizing coatings. These are finishes which dry by combination with oxygen and usually contain driers as catalysts. Oxidation of the coating results in a reduction of the dyestuff with accompanying loss of color and sometimes change in shade. This effect can be observed as the coating dries and great changes may occur in the space of several hours. Baking the finish speeds up the process and ten minutes can result in 50-75% loss of color. Most reds and blues are very prone to this reaction. There are, however, some dyes which yield satisfactory gold and brass colors in oxidizing systems.

An analagous reaction occurs when dyestuffs are stored for any length of time in iron containers. The oxidation of the iron with the accompanied reduction of the dyestuffs in solution cause a rapid exhaustion of dye. Stainless steel or coated tanks are to be recommended for storage of dip dye solutions.

Testing of Dip Dye Solutions

In addition to the properties already discussed, such as fading, sublimation, chemical reduction, etc., there are several additional procedures that should be familiar to the metalizer for the evaluation of dip dye solution.

Since excess dye is usually rinsed off with water, it is important to know how the dye reacts to dilution with large quantities of water. Add one fluid ounce of dye solution to one gallon of water. A proper dye solution will either completely disperse or form a uni-

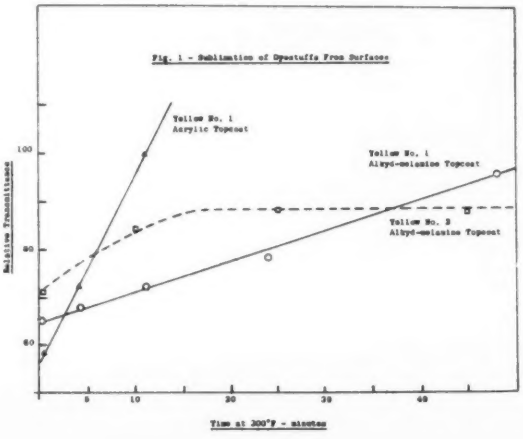


TABLE 1

Proposed Standard Test Methods for Dip-Dye Solutions

Test	*Method*	*Passing Standard*
Color	Dip samples at 70°F. for 2, 5 & 10 secs.	Match color only in daylight
Crocking	Rub dyed sample with white cloth	No dye on cloth
Heat Sensitivity	Cure dyed sample 30 mins. at baking temperature	No color change
Light Fastness	Expose ½ of dyed sample 15 hours in direct sunlight	Slight, or no fading
Resistance to Chemical Reduction	Dye oxidizing varnish after no longer than 2 hours drying under conditions of use	No loss of color after 24 hours
Stability	Expose open jar of solution for 3 days	Less than 50% loss of strength, no color change
Sublimation	Cure dyed sample 1 hour at baking temperature	No loss of color
Water Dilution	Add 1 part dye to 100 parts water	Precipitate, if any, should not adhere to sample
Water Spotting	Observe droplet of water clinging to freshly dyed sample	No white blush under droplet

formly cloudy solution. Some dyestuffs will precipitate in this test. If the particles settle after precipitation the dye solution will usually perform well; however, if they float, one may encounter dye particles adhering to the surface of the pieces. This type of dye may have other desirable properties, and may be successfully used only with a continuously running over-flow rinse tank.

Another simple test to perform upon dye solutions is to fill an open head jar with fresh solution and allow to stand open for several days, then check the strength. Some loss in strength should occur but not more than a 50% decrease is acceptable. Check the color and clarity. If one dyestuff precipitates and another remains in solution the color will have changed.

Finally, dyed and dry pieces should also be tested for crocking by rubbing them with a clean white cloth or tissue. No color should be removed. Crocking is caused by ultra fine particles of dye clinging to the piece.

Table 1 is a full list of test methods and acceptable standards for dip dye solution.

Water Spotting

Water spotting is one of the major problems encountered in dip dyeing and therefore warrants separate discussion. There are two major reasons for the appearance of water spots. The first is the incompatibility of the top coat film with water. If the dye solution is too strong, active solvent softens and penetrates into the top coat. Whenever droplets of rinse water remain on the pieces, water mixes with entrapped solvents and coating, creating a blush similar to that obtained by spraying certain coatings on humid days. If the solvents escape before the water, a permanent spot is left. Heating the coating usually hastens the escape of the solvents and generally aggravates the condition.

The second cause of water spots is the deposition of dissolved matter from the rinse water upon the evaporation of the clinging droplets. Elimination of spots therefore involves minimizing these two factors. Work should be well agitated to remove most of the clinging water droplets. It is generally possible to formulate dye solutions which do not cause a blush to appear under droplets of water. If a blush does not appear, placing the wet trucks in the oven prematurely can produce spots by closing the film before trapped moisture can escape. Therefore, a drying period at room temperature is to be recommended where feasible.

Detergents may be used to prevent the formation of droplets. They are usually employed in a second rinse tank in order to prevent precipitated dye particles from adhering to the foam.

The use of a hot water rinse (100-120°F.) aids in the elimination of spotting since it increases the compatibility of the film with water and decreases its tendency to blush. Infrequent changes of rinse water or hard water also cause water stains.

A final rinse in deionized water greatly diminishes spotting due to dissolved solids.

Some Additional Hints on the Proper Use of Dip Dyes in the Metalizing Plant

When using the supersaturated type dyes, containers should be thoroughly agitated before use. Otherwise, considerable quantities of dye are wasted.

Dip dye tanks should be tightly covered when not in use. When left open, active solvents evaporate causing dye precipitation and loss of dye strength.

The dye tank should be cleaned thoroughly at least twice a year to remove precipitated sludge. An accumulation of sludge can result in particles floating in the dye bath.

Store dye solutions in warm areas and do not use them when they are at temperatures below 60°F. Freezing temperatures can cause dye solutions to crystallize.

The dye solutions that are currently being offered are the most judicious compromise industry can make today with the tools at its command. Progress is being made in this field, however, and the metalizer may anticipate solutions to each of his problems as the latter arise.

Science for Electroplaters

48. Electrodeposited Metals

By L. Serota

THE electrodeposition of metals, from the point of view of the electroplating industry, has two main functions: the formation of thin metallic coatings for decorative purposes or corrosion resistance; and, the increasing application of heavier or thicker electrodeposits for engineering purposes, such as electroforming and the building up of worn parts. In the first of these functions, for determining the value of an applied thin metallic coating, *A. Brenner* and associates consider the following as important properties: surface appearance including color and reflectivity, hardness, abrasion resistance, and ductility — as well as the chemical properties relating to corrosion resistance. For the heavy engineering electrodeposits, important mechanical properties, such as internal stress, tensile strength, hardness, ductility, yield strength, and fatigue limit are emphasized; and, for special applications, electrical, magnetic, and thermal properties are included.

W. Blum notes that, for the plater, appearance rather than composition of the finished deposit is of primary concern, and a "good deposit" is defined as one which is fine grained — since fineness of grain is generally accompanied by a high luster, relative freedom from porosity, and comparative hardness. This factor, the structure of the metal, the author contends, is especially important in electroplating where the physical properties have a direct bearing on the durability of the product.

Mechanism of Electrodeposition

The actual mechanism or electrolytic process, whereby a metallic ion in solution is changed to an atom (solid metal) and deposited on the electrode, has been the subject of extensive investigation. *W. Blum* and *H. S. Rawdon* present the view that, in most instances, ion discharge and metallic crystallization are the same process, neutralization of the metal ion occurring at a point on the cathode surface requiring the lowest discharge potential, which is determined by the metal ion concentration and solution pressure of the metal crystal.

A. W. Hothersall describes the process by depicting the cations in the liquid near the cathode as being drawn to the surface, with neutralization of the electric charge by electrons resulting. Surface forces will then draw discharged ions on to the surface of the growing crystal.

J. O. Bockris, in discussing the AES research project "Mechanism of Electrodeposition," reports that results indicate that the rate of deposition is determined by transfer of metal ions to the electrode and the simultaneous neutralization of the metal ion. Migration to a growing crystal is rapid. Results also support the theory that deposition occurs at active spots with total area 1/10 to 1/100 of the apparent area. The cupric ion was considered for this study because deposition from a number of simple uncomplexed solutions was possible, and also because the activation energy necessary for the initial deposition could be measured.

Cathode Film

J. N. Agar considers the movement of the solute between the liquid phase and the electrode/solution interface (cathode film) to occur in three ways, namely: (a) diffusion, (b) convection, (c) ionic migration. These factors introduce at the interface a metal ion (and in some cases hydrogen ion) concentration which is lower and thus differs from that in the rest of the solution, accounting thereby for concentration overpotential and limiting currents. This concentration gradient between the electrolyte and the cathode film has been described as a stationary layer of liquid in contact with the cathode with only diffusion possible, whereas, beyond this layer concentration is maintained mainly by convection, as indicated in Fig. 187.

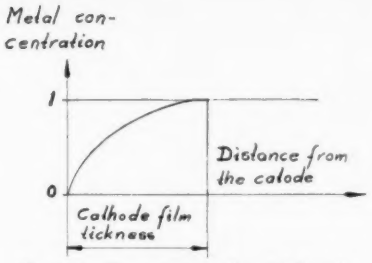


Fig. 187. Concentration of metal ions in cathode film.

Data obtained by Agar from experimental heat transfer calculations show that the thickness of the diffusion layer averaged 0.05 cm. for vertical surfaces in unstirred solutions (natural convection), and 0.005 cm. or less in stirred solutions, depending on the rate of stirring. Mechanical agitation, it is evident, makes it possible to reduce the thickness of the cathode film appreciably.

Since diffusion proceeds from the more concentrated to the less concentrated part of the solution, with the rate increasing as the difference in concentration becomes greater, a higher concentration of metal to be deposited is preferred, so that diffusion velocity across the cathode film will increase. Similarly, neutral salts, such as ammonium chloride, used formerly in nickel baths for increasing the conductivity of the solution, are eliminated in modern baths, where practical, since ion migration of the metal to be deposited is hampered.

Natural convection in a plating solution, due to differences in bath temperature or to gas evolution, is not sufficient to provide the cathode film with the required amount of cations for deposition at a current density considered satisfactory from economic and technical viewpoints. Agitation, therefore, is introduced now by such means as compressed air, cathode motion, and pumping the solution. An increase in convection allows more ions to reach the cathode film per unit of time. This procedure will also increase migration of ions through diffusion.

Limiting Current

The limiting current, I, represents the maximum value of the current for the deposition of a single ion species and may be expressed by the formula:

$$I = \frac{R}{zF} \cdot \frac{\lambda T.C}{\delta}$$

, where R the gas constant = 8.313 joule; F is the Faraday = 96,500 coulombs; z is the

valence of the ion; λ is the equivalent conductance of the ion; T is the absolute temperature; C is the concentration in gram ion per liter in the cathode film, and δ is the thickness in cm. of the cathode film. The variables in a solution are C. T and δ. The other values are constant. Limiting current, accordingly, is increased with increased concentration and temperature and diminishing thickness of the cathode film. Using a value of 50 ohms $^{-1}$ cm^2 for λ, and .05 cm. for δ, at a temperature of 20°C.. the limiting current is given approximately as $I_L = 0.025$ cm. $\times$ z $\times$ c amp./cm^2.

G. Gabrielson demonstrates the use of this formula with the following example. For a nickel plating bath with 70 g./l. nickel. the limiting current may be calculated. The valence (z) of nickel is 2 and the atomic weight is 59.1; hence $I_L = 0.025 \times 2 \times \frac{70}{59} \times 100 = 5.95$ amp. dm^2., as the limiting density of nickel in the above solution. The deposition process will occur at 100 per cent efficiency until the limiting current is exceeded. Beyond this point another deposition process begins to compete with the first, resulting in a drop in current efficiency.

Crystal Growth

A smooth. adherent, fine grain metallic deposit will be obtained when the current density and metal ion concentration are high and a low but constant concentration of the ion to be deposited is maintained in the cathode film. Increased current density promotes reduced grain size, because the increased rate of deposition depletes the metal ions in the solution at a more rapid rate near the cathode. An increase in temperature or agitation, however, will aid mobility so that replacement of deposited ions near the cathode is more rapid and increased grain size results.

The effect of current density and temperature upon grain size was shown experimentally by *A. Butts* and *V. De Nora*. A decrease in grain size resulted from increased current density and decreased temperature. This is indicated in Fig. 188. The variation in grain size was attributed to the increased rate of nuclei formation. A 2N $CuSO_4 \cdot 5 4_2O$ (63.6 g./l. Cu) solution was used. Electrodeposition of a cation such as copper, it is noted, will result at a point on the cathode where the current line from the anode ends.

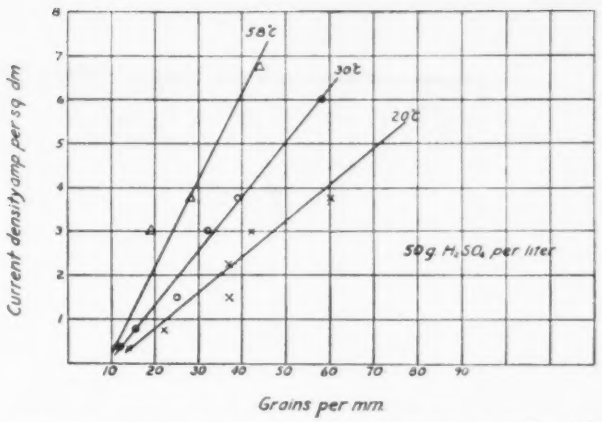


Fig. 188. Variation of grain size with current density at 20°, 30°, and 58°C.; acidity 50 g./l.

The authors, in considering crystal growth from nuclei, refer to the basic concepts of crystallization of a metal from the liquid state propounded by *G. Tamman*, wherein the theory is advanced that crystallization is affected by the rate of nucleus formation KZ (Kern Zahl) per unit volume and the rate of crystal growth (Kristallisations Geschwindigkeit) in all directions. Grain size will vary in the ratio of $\frac{KG}{KZ}$. KG can be expressed in terms of outward growth, which favors fine grain size, and lateral growth for coarse grain size.

H. J. Read and *A. K. Graham*, in their experimental study of electrolytic films in acid copper baths, found that the decrease in copper concentration in the cathode film is greater at higher current densities. Further, since the voltage is not sufficiently high to discharge hydrogen, a corresponding increase results in acid in the film. Data for three baths with different concentrations of copper and a sulfuric acid content for each bath of 41-45 g./l., operated at a temperature of 30°C. at different current densities, are given in Table 1. The significant observation is made that variation in copper concentration has virtually no effect on copper decrease in the film.

Although reduction of the metal ion concentration can be attained by using dilute solutions, the method is not satisfactory because a low current density would be necessary to avoid burnt or spongy deposits. It is possible, however, to maintain a solution with a large quantity of dissolved metal salt and a low metal ion concentration, thus permitting the use of a high current density. This method provides a rapid supply of ions for discharge and deposition by introducing a complex metal salt, as in the cyanide solution, or by using a common ion such as sulfuric acid (or sodium sulfate) in the copper sulfate solution. For example, in the potassium copper cyanide solution with an excess of potassium cyanide present, the concentration of free ions due to complexation is reduced to 10^{-27} g./l., since the complex copper cyanide is dissociated to a very slight extent.

The influence of increased conductivity in attaining a given current

TABLE 1

Effect of Copper Concentration on Film Composition

Copper Content g./l.	Current Density amp./dm.^{2}	Current Density amp./ft.^{2}	Copper Decrease g./l.	Acid Increase g./l.
37	1.1	10	0.92	0.90
53	1.1	10	1.04	1.00
63	1.1	10	0.98	0.92
37	2.7	25	1.83	1.83
53	2.7	25	2.05	1.80
63	2.7	25	2.04	1.49
37	4.3	40	3.10	2.64
53	4.3	40	3.08	2.81
63	4.3	40	3.03	2.52

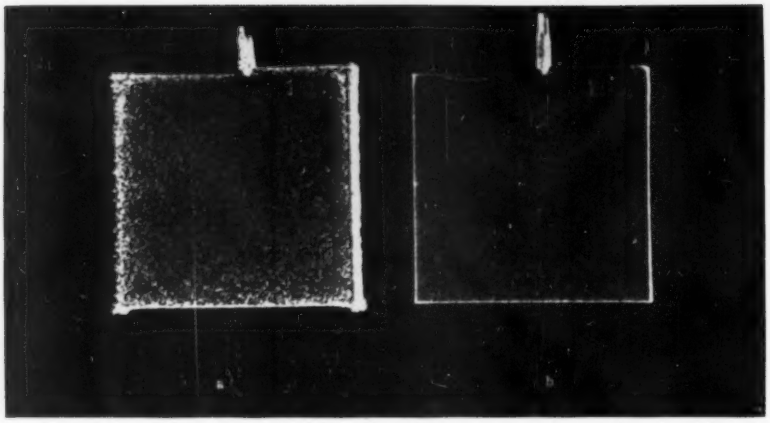


Fig. 189. Copper deposits (¾ size). Effect of conductivity upon treeing. a) Copper sulphate N, Sulphuric acid 0.1 N, b) Copper sulphate N, Sulphuric acid 1.1 N.

density at a lower voltage by the addition of sulfuric acid to a copper sulfate solution was demonstrated by *W. Blum*. An added effect was the decreased tendency for treeing, based upon a reduction in the potential drop through the solution. It was found that the resistivity, 22.4 ohms (25°C.), of a solution (a) consisting of 1.0N copper sulfate and 0.1N sulfuric acid was reduced to 4.9 ohms when the solution (b) contained 1.0N copper sulfate and 1.1N sulfuric acid. Although the common (sulfate) ion effect will cause a decrease in the copper ion concentration, the increase in conductivity due to the addition of sulfuric acid is considered sufficiently greater to account for the reduction in treeing effect. Fig. 189 shows very clearly this effect of conductivity upon treeing. Fig. 190 shows the reduction of grain size with a decrease in metal ion concentration, with the greatest decrease in crystal size evident for the cyanide bath. The standard solution consisted of 1.0N copper sulfate plus 0.1N sulfuric acid (4.9 g./l.). Solution C was the 1.0N double cyanide bath. Deposition occurred at a current density of 1 amp./dm.^{2}

Another factor that would tend to effect a difference in potential between the cathode and the solution, thereby increasing crystal growth, is the presence or introduction of substances such as colloids, molecules, or ions which will interfere in the diffusion process on or near the cathode surface. *A. W. Hothersall* refers to this obstruction of free movement of the metal ions as the "interference theory," indicating that large crystals will result if the interfering particle is small, and fine, hard-grained deposits will be obtained if the size and number of particles interfering is large. Thus, with little interference, crystal growth will be outwards and sideways so that large broad crystals form, whereas, preferential interference with the motion of the ions or atoms will cause new crystals to form. *J. J. Dale* notes that, for the initial electrodeposition process, a continuous film is *not* formed on a cathode surface. Film growth occurs at various points or nuclei on the surface, with crystals increasing fairly rapidly sideways as well as slowly outwards. The crystal boundaries meet in a few seconds to form a continuous film. Surface irregularities, scratches, pits, and similar imperfections will affect the area of nuclei. Thus, high points, as indicated in Fig. 191, serve as nuclei for crystal growth. This is understandable, since such high points receive a higher proportion of current and serve as centers of growth of radiating structures.

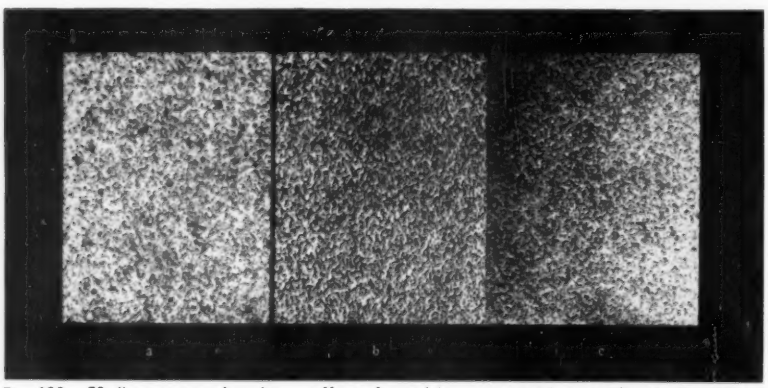


Fig. 190. 20 diam. copper deposits — effect of metal ion concentration. a) "Standard" solution; b) "Standard" solution + N sodium sulphate; c) Cyanide solution.

Crystal Structure

Crystal growth is governed by the formation of new nuclei or continued growth of new crystals. Where plating conditions are not properly controlled, growth of the electrodeposit may be normal, resulting in such malformations and defects as nodules, Fig. 192, trees, blisters, and cracks. Classification of various structural features is represented by *J. J. Dale* in Table 2.

Fig. 191. Nickel Deposit × 300.

Nodule formation may result, according to *W. Meyer*, if the deposit is strongly acicular or columnar, with

TABLE 2
Structural Features

Common Forms
Acicular crystals
Conical crystals
Fan-like crystals
Less Common Forms
Nodular or spheroidal shapes
Laminated or banded deposits
Defects and Abnormalities
Large nodules
Trees
Pits
Blisters
Cracks
Burnt deposits
Powdery deposits

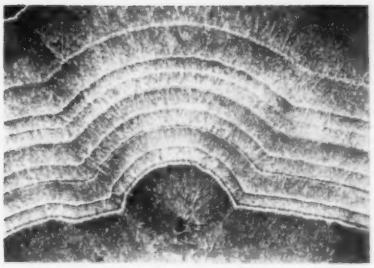


Fig. 192. Nodule in Brass Deposit × 100.

growth following the basis metal pattern, occurring faster than lateral growth. Such conditions, it is indicated, will exist in baths with simple ions such as acid copper, tin, silver, or nickel. A second condition cited for nodule formation is introduced in complex-ion solutions, where codeposited basic or foreign matter will cause small grain size by acting as nuclei from which nodules may develop as a result of growth perpendicular to the fine scale surface.

Basis Metal Effect

The basis metal, under certain conditions, will produce a pronounced effect upon the electrodeposit, a phenomenon known as continuity. In this effect the crystal growth of the electrodeposit gives evidence of being built on to individual basis metal crystals, indicating the same crystal form and orientation, with boundaries appearing as continuations of these basis metal crystals.

A. K. Huntington, in 1905, reported on this influence of a copper base upon the microstructure of a copper deposit. *G. B. Hogaboom*, in 1916, suggested consideration and study of the influence of the physical structure of the basis metal on the electrodeposit and, at a later date (1921), reported on the observation of this effect, continuation of crystal growth, from photographs of copper deposits on a copper base.

W. Blum and *H. S. Rawdon*, in 1923, made a study of the deposition of copper upon copper strips with definite structure from cold-rolled sheet (also annealed) copper and cast copper cut from a pig of the metal. The prepared strips 3 x 10 cm. were cleaned with benzene and alcohol, followed by cathodic electrocleaning in an alkaline (cyanide) solution. After a rinse, the lower half of each strip was dipped in dilute (1:1) nitric acid. Copper plating of the specimens, using an acid copper bath, was followed by a heavy nickel plate for the purpose of defining the boundary of the copper, and a subsequent copper plate as an aid for mounting and polishing prior to microscopic examination. The plated specimens were etched with a mixture of ammonium hydroxide and hydrogen peroxide.

A representative result, Fig. 193, shows that, in the portion which was pickled after the alkaline cleaning, the deposited copper follows the structure of the basis metal. The bottom layer in this photograph is the basis metal, the continued electrodeposited copper layer is next followed by the deposited nickel and second layer of copper. The arrow shows clearly the orientation for the crystals of the electrodeposit as identical with that of the cast copper.

A surface which has been alkaline cleaned without also being acid-etched prior to plating, will give the fibrous or columnar structure of electrodeposited copper, indicating that for good continuity it is necessary to acid etch to be sure of removing the altered layer on a polished or machined surface. In this respect, *A. K. Graham* notes that his experimental results with copper deposition indicates that the basis metal structure, even with a buffed cathode surface, is reproduced when the copper strip is transferred directly from cyanide cleaning and rinse into the plating solution.

Further confirmation of continuation of microstructure was obtained by *A. W. Hothersall* with deposits of copper, nickel, and tin. Continuity, he found, was only possible between metals with the same crystal system when the ratio between their lattice parameters was within certain limits. The view was expressed that, where a high degree of adhesion is obtained between basis metal and deposit, some degree of continuity occurs.

In investigating the influence of the base structure on the crystal orientation of the deposit, *L. L. Shreir* and *J. W. Smith*, using x-ray diffraction photographs, provided additional evidence that, at a low current density, crystal development of the basis metal, preferred orientation, occurs; whereas, at high current densities, which are favorable to nucleus formation, random orientation occurs with the nature of the deposit being influenced by external conditions.

Two types of copper base were used in this study. Type A was a cold-rolled copper foil, 0.004 inch thick with pronounced preferred orientation. Type B

(*Continued on page* 96)

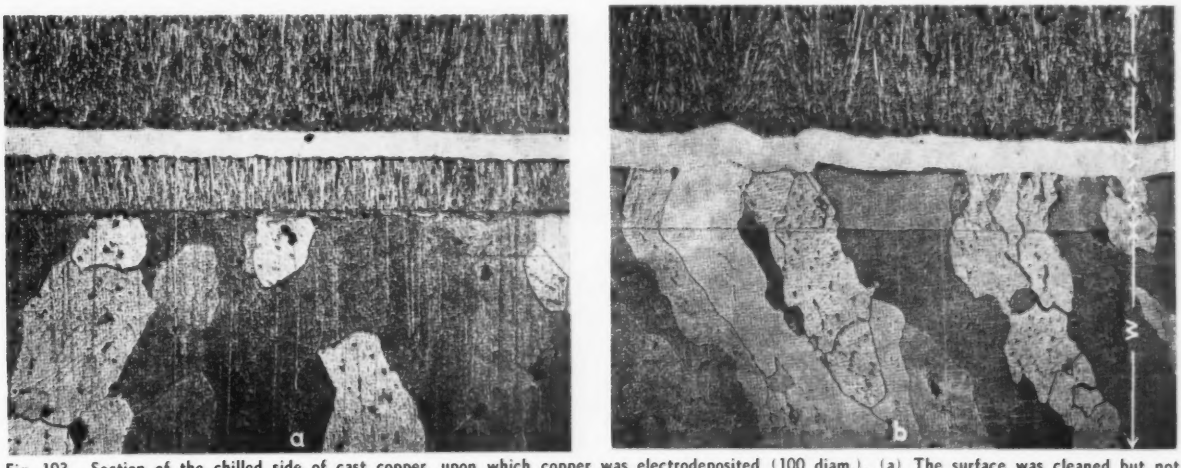


Fig. 193. Section of the chilled side of cast copper, upon which copper was electrodeposited (100 diam.). (a) The surface was cleaned but not pickled prior to the electrodeposit. (b) The surface was pickled (bright-dipped) after cleaning. The various zones indicated in (b) apply also to (a), i.e., W, base metal; X, electrodeposited copper (first layer); Y, electrodeposited nickel; and Z, electrodeposited copper (second layer).

SHOP PROBLEMS

BARREL FINISHING — POLISHING AND BUFFING
CLEANING — ANODIZING — ELECTROPLATING
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METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Iridium Deposition

Question: As a subscriber to METAL FINISHING magazine, we wish to ask you if there has been some literature, books or articles, published on the plating of iridium. If so, we would appreciate your giving us names of the publishers, titles of the books, etc.

R. R.

Answer: Although an aqueous complex nitrate bath for depositing iridium was patented by Wise (#1,970,950, Aug. 21, 1934), the only satisfactory process of which we are aware uses a fused bath, disclosed by Withers & Ritt in the 44th Annual Proceedings of the American Electroplaters' Society (1957).

The process consisted of dissolving iridium in a molten mixture of potassium and sodium cyanide at about 600 deg. C., using alternating current at 10 amp./sq.ft. Ductile, adherent and fine-grained deposits were produced from this melt at about 10 amp./sq.ft.

Stained Brass Plate

Question: We have been having some trouble with our brass bath in that the items come out with a green tinge as the sample enclosed. Even the new bath turns out this green finish. When we reinforce the bath with cyanides it goes away for a while but later shows up again. We brass plate over nickel bath but even the polished items show this green.

L. F. Z.

Answer: Such discolorations are usually due to improper drying of the brass deposit or to an excessively thin lacquer coating. The iridescent green stain is especially prevalent when a water-displacing liquid is used and followed by solvent degreasing, if the latter operation is not performed carefully or the solvent is dirty.

We have also seen this condition on parts plated from baths which were out of balance. However, the inside face of the sample does not show the stain.

Aluminum Finish

Question: We have been requested to produce a finish on aluminum according to specification A-1-M-4 and, although we have what we consider a fairly complete list of government specifications, we find no such listing or anything near it. Is this a standard specification finish or is it just something in a company's list of finishes? We hope you can be of help since the contract will be an important one to us.

N. R. G.

Answer: A-1-M-4 is a finish coding for architectural finishes for aluminum and not a standard specification. A-1 refers to the most popular type of clear anodic coating, produced by 30 minute treatment in the 15% sulfuric acid bath. For exterior application, the minimum coating thickness should be 0.0004", which is equivalent to 17 mg./sq. in. M-4 is a medium satin finish with parallel scratch lines, which is produced by a 120-140 grit wheel or belt, at about 6,000 feet/min.

Gold Colored Finish

Question: Recently, we were asked if we could apply an anodized coating to some military brass belt fittings and buttons. We informed the people concerned that we had never heard of such a process except on aluminum. They insisted, however, that it was anodized brass and that it imparted a bright coating to the buckles which remained bright and required no further polishing.

They also said that anodized buttons were available in certain clothing stores and that the process was used by various plating shops in the East.

I have considered that they might be highly polished and lacquered or possibly gold alloy plated, but would be very thankful if you could enlighten me further on this subject.

C. P. C.

Answer: We know of no anodized finish for brass either. Gold-dyed anodized aluminum is often mistaken for gold or for brass. However, if a sample is available, it can be tested easily with a nitric acid dip.

Copper Purity

Question: What is the difference between "fire refined" and "electrolytic" copper? Are both metals just as suitable for anodes?

D. C.

Answer: Electrolytic copper, with its additional refining, is purer than fire refined copper; the impurities, excluding oxygen, are about 0.15% for the latter and about 0.01% for the former. Although these may appear to be very small amounts, difficulties may arise in the use of fire refined copper for plating purposes and electrolytic metal is recommended.

Fingerprint Removal

Question: As soon as the weather gets warm we begin to have trouble each year with fingerprints on our finished items, which are made of highly polished brass. If the fingerprints are not wiped off immediately we find that they often are no longer removable. Gloves help for a while but, after a few hours of use, they become too dirty and have to be discarded. Is there some dip available which would remove this marking defect, or can you recommend a procedure we could follow which would be less expensive than wiping each part by hand?

G. D. N.

Answer: Fingerprints are a type of

soil most difficult to remove and, because of the acidity of the perspiration, may etch the metal if left on for an extended period. Dips which have been suggested in the past include a 0.1% solution of mild alkali, such as borax, disodium phosphate, sodium metasilicate, etc., containing about 0.1% sodium nitrite; methanol; and water-displacing solvents. The last can be removed by degreasing. Proprietary materials are also available from many suppliers of alkaline cleaners and detergents.

If the fingertips are dusted with powdered talc there will be less tendency to produce fingerprints. Thin cotton gloves are most effective. If a sufficient supply is carried, they can be changed as often as necessary and arrangements can usually be made with a local industrial laundry to recondition them on a regular basis.

Bright Dipping Iron

Question: At present we are using the oxalic-sulfuric-peroxide solution for dipping iron but wonder if any other type of solution can be employed for the purpose. We have been told that there is a chromic acid-sulfuric acid process which will bright dip ferrous metals and have communicated with one of our suppliers. However, all he has to offer is a similar solution, which we have purchased and tried with slightly better results and increased life. We would like to experiment with the chromic type bath, if your files can come up with some formula with which we could start.

L. N.

Answer: A solution suggested by *G. E. Gardam* consists of 500 g/l chromic acid and 150 cc/l sulfuric acid, which is used at room temperature or slightly warm, with gentle agitation. The parts are first pickled in 10-20% sulfuric acid for 1-2 minutes.

The solution is stated to be satisfactory for low and medium carbon steels (0.5% C). High carbon steels will brighten when hardened but not while soft, and cast iron is smoothly etched by the dip. The solution is not replenished but is worked to exhaustion and then dumped. Metal removal rate is said to be about 0.0015" per hour.

Gold-Colored Metal

Question: We would like to produce two finishes which have the appearance of gold. However, no one seems to have heard of the finishes which were given to us, namely Emerald Brass and Mosaic Gold. Do you have any information on these finishes and how they can be produced? We would appreciate hearing from you as soon as possible.

D. J.

Answer: Emerald brass is an age-

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hardening brass, which contains aluminum and has a gold color. The composition of the alloy is 50% copper, 49% zinc and 1% aluminum. Mosaic gold is a rather high brass, of approximately 65.5% copper and 34.5% zinc content.

We know of no method of producing the former by electrodeposition and, although electrodeposits of the same composition as Mosaic gold can be obtained without too much trouble by suitable modification of standard brass plating solutions, the color will not be the same as the solid metal. A gold colored brass deposit containing copper, zinc and tin can be produced from a proprietary solution and details and supplier's name are being forwarded.

Blue Gold Deposits

Question: We are very interested in obtaining a formula for a blue gold electroplating solution. The head of our Electroplating Dept. knows that he has seen such a formula in a handbook or manual some time ago, but he has been unsuccessful in finding it in any of the publications available to him.

Our production work on jewelry requires frequent changes in finish to keep our line interesting to our customers, and we would like to experiment with a blue gold finish. We hope you can assist us by suggesting a formula source, and we will greatly appreciate whatever assistance you may be able to render.

J. A. M.

Answer: We have no formula for a process for producing a blue gold. However, about 25 years ago D. Gray suggested that a sky-blue colored gold deposit could be obtained by adding a little indium and silver to the gold bath, the deposit being then heated at 1500°F.

Bright Silver Finish

Question: Some of our wave-guide specifications call for "bright silver" finish. How does this differ from ordinary silver plate? Also, why is silver specified as a finish? Is it to protect the copper wave-guide from corrosion, or is there an electrical resistance problem?

L. P.

Answer: Bright finish is produced by the use of a silver plating solution containing brighteners. Silver is employed in wave-guides because of its excellent electrical conductivity. Very high frequency currents are known to travel on the surface of a conductor so that, by applying a silver deposit to the copper wave-guide, the conductivity is about the same as if the guide were made of solid silver.

SCIENCE FOR ELECTRO-PLATERS

(*Continued from page* 93)

was the same type of foil annealed at low temperature, with annealing continued until the x-ray diffraction pattern showed that preferred orientation was eliminated. The copper bases were cleaned with benzene, hot electrolytic cleaner, and electrolytic polishing. The last step was substituted for mechanical polishing to eliminate any possible error caused by surface strain. The plating solution consisted of 125 g./l. $CuSO_4 \cdot 5H_2O$ and 50 g./l. H_2SO_4.

The effect on crystal formation on both types of foil at various current densities is indicated in Table 3. It is evident that, below 1.6 amp./dm^2., the basis metal structure for the cold-rolled foil will influence the deposit, whereas, at higher current densities little, if any, preferred orientation of the deposit occurs. The annealed foil, it will be noted from the table, shows random orientation at all current densities. These effects are strikingly shown in the three x-ray diffraction photographs. In Fig. 194 the deposit obtained on cold-rolled foil at 0.2 amp./dm^2. shows the pronounced preferred orientation (continuity) on the cathode foil: whereas on the cold-rolled foil at 3.0 amp./dm^2., Fig. 195, the crystal form for the deposit shows a random orientation of grain. Fig. 196 is representative of the deposits on the annealed foil, with definite evidence clearly indicated of random orientation.

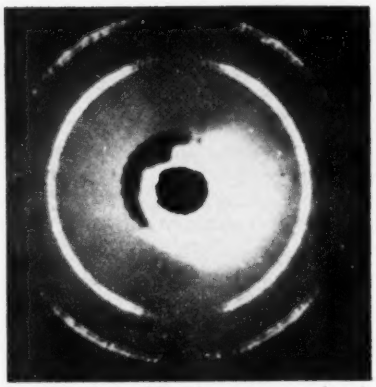


Fig. 194. X-ray diffraction pattern — deposit on cold-rolled foil at 0.2 amp./dm.^{2}

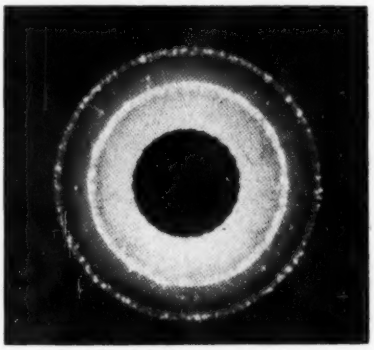


Fig. 195. X-ray diffraction pattern — deposit on cold-rolled foil at 3.0 amp./dm.^{2}

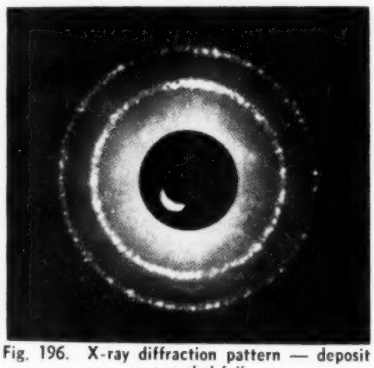
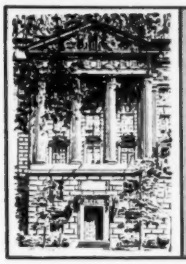


Fig. 196. X-ray diffraction pattern — deposit on annealed foil.

TABLE 3

Crystal Forms of Deposits Produced at Various Current Densities

Current density amp./dm.^{2}	*Base A (cold-rolled foil)*	*Base B (annealed foil)*
0.2	Pronounced preferred orientation	Random orientation
0.4	Pronounced preferred orientation	Random orientation
0.6	Pronounced preferred orientation	Random orientation
1.0	Pronounced preferred orientation	Random orientation
1.2	Pronounced preferred orientation	Random orientation
1.6(a)	Pronounced preferred orientation	Random orientation
1.6(b)	Very slight preferred orientation after 3 hr. deposition	
2.0	Random orientation	Random orientation
3.0	Random orientation	Random orientation



Patents

RECENTLY GRANTED PATENTS IN THE METAL FINISHING FIELD

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Thickness Tester

U. S. Patent 2,852,850. *Sept.* 23, 1958. *E. J. Martin, assignor to General Motors Corp.*

The method of measuring the thickness of an overlay material on a base metal comprising the steps of disposing a metal instrument in engagement with the surface of the overlay material, displacing the instrument through said overlay material, detecting the change of contact potential developed by engagement of the instrument and base metal, and measuring the displacement of the instrument.

Light-Fast Colored Lacquers

U. S. Patent 2,853,397. *Sept.* 23, 1958. *H. Seibert, W. Bunge and O. Bayer, assignors to Farbenfarbriken Bayer Aktiengesellschaft*

The process of manufacturing improved organic dyestuff colored lacquers which comprises incorporating N-substituted urethanes of the group consisting of polyurethanes containing at least 2 urethane groups per molecule and urethanes having at least 1 urethane group bound to a cyclic radical.

Brush Cleaner and Dryer

U. S. Patent 2,853,085. *Sept.* 23, 1958. *A. Torkelson*

In a paint brush cleaning machine, an agitator mechanism comprising, in combination, a liquid tight housing having a top wall, a motion transmitting rod having one end extending through said top wall into said housing and motion producing means carried by said top wall connected to said one end of said rod for rotating and longitudinally reciprocating said rod.

Electropolishing Uranium

U. S. Patent 2,853,441. *Sept.* 23, 1958. *O. Flint, assignor to the United States of America*

A method of producing a bright lustrous finish on surfaces of bodies of uranium and uranium-rich alloy, wherein the surface is caused to undergo anodic electrolytic treatment in a solution of citric acid.

Plating Bath Control

U. S. Patent 2,853,442. *Sept.* 23, 1958. *W. F. Swanton, assignor to Pfaudler Permutit Inc.*

In an electrolytic process wherein heat is generated during the electrolytic action occurring in an electrolytic bath and said bath is diluted by a stream of makeup water, the method of controlling the temperature of the bath and concentrating the electrolyte which comprises the drawing of electrolyte from the bath, maintaining said withdrawn electrolyte under sub-atmospheric pressure for evaporating a portion of the same for concentrating and cooling the remainder, returning said cooled and concentrated electrolyte to said bath, and regulating the quantity of electrolyte withdrawn from said bath and returned thereto in accordance with the temperature of the electrolyte in order to maintain the temperature of said bath within predetermined limits.

Acid-Copper Brightener

U. S. Patent 2,853,443. *Sept.* 23, 1958. *R. E. Harrover, Jr., assignor to Westinghouse Electric Corp.*

An aqueous electrolyte plating solution comprising copper sulfate, sulfuric acid and from 0.0001 to 0.5 ounce per gallon of the product obtained by admixing and heating substantially equimolar quantities of at least one compound having the nucleus

$$\begin{matrix} & & \| & & \\ -C- & N & - & C & - \\ & | & & \| & \\ & H & & S & \end{matrix}$$

with at least one alkylolamine selected from the group consisting of primary, secondary and tertiary alkylolamines in which the groups substituted on the nitrogen atom are selected from the group consisting of hydrogen, alkyl groups, and alkylol groups having from 1 to 4 carbon atoms, there being at least one alkylol group per molecule.

Wrinkle Coating

U. S. Patent 2,853,458. *Sept.* 23, 1958. *B. E. Lederman, assignor to Midland Chemical Corp.*

A new wrinkle drying coating composition made up of the following:

	Parts by weight
Rosin-modified phenol formaldehyde resin	100
Raw tung oil	75
Oiticica oil	25
Air blown heat bodied fish oil having an iodine number between 180 and 225	25
Xylol	110
Varnish makers' naphtha	110

Drier cobalt naphthenate 6% added in ratio 65 parts by vol. varnish to 1 part cobalt naphthenate.

Electropolishing Apparatus

U. S. Patent 2,853,447. *Sept.* 23, 1958. *H. J. Hackenburg*

An apparatus for electropolishing work comprising a tank adapted to contain a bath of electrolyte, a source of direct current voltage, a rotating shaft connected to one terminal of said source, a perforate non-conductive barrel having a closed end and an open end for holding said work, a perforate anode positioned interiorly of said barrel adjacent said closed barrel end in contact with said work, a non-conductive support, an electrical conductor mounted interiorly of said support and exposed at two spaced surface portions of said support to provide two spaced acreas for electrical connections, one of said areas being electrically connected through said closed barrel end to said anode and thereby mounting said barrel on said support, the second of said areas being connected to one end of said shaft for connecting said anode to said shaft.

Water-Dispersed Organic Coating

U. S. Patent 2,853,459. *Sept.* 23, 1958. *R. M. Christenson and D. P. Hart, assignors to Pittsburgh Plate Glass Co.*

An oil-free, water-dispersed coating composition containing as the sole resinous components thereof from 75 percent to 85 percent by weight of a reaction product of a glyceride oil fatty acid and an alkyd esterification product of a polycarboxylic acid selected from the group consisting of a phthalic acid, phthalic anhydride, maleic acid and maleic anhydride, and a polyhy-

dric alcohol containing at least three hydroxy groups, said alkyd esterification product being further modified with a polyalkylene glycol and from 15 percent to 25 percent by weight of a water-soluble lower alkanol-modified melamine-aldehyde resin, said percentages being based upon total non-volatile weights, and as the sole dispersing medium, water.

Steam Cleaning Gun

U. S. Patent 2,854,284. *Sept.* 30, 1958. *A. P. Thomas, assignor to Oakite Products, Inc.*

A cleaning gun comprising a body portion with a steam passage and a solution passage therein, a steam pipe having its inner end secured in and extending from the body portion and communicating with said steam passage, said body portion having a space therein around the steam pipe communicating with the solution passage, a solution pipe carried by said body substantially concentric with and extending beyond the free end of the steam pipe, means holding the free end of the steam pipe in spaced relation with the free end of the solution pipe, and a body of insulation on the periphery of the steam pipe extending from the inner end and terminating at an intermediate point thereof.

Phosphate Coating

U. S. Patent 2,854,370. *Sept.* 30, 1958. *M. Kronstein, assignor to Oakite Products, Inc.*

A phosphate coating composition consisting principally of water and at least one phosphate coating agent selected from the group consisting of phosphoric acid and salts thereof, said composition containing at least about one percent of an accelerator consisting essentially of an unsaturated alcohol containing at least one triple bond, said accelerator being soluble to the extent of at least one part in three parts of water.

Conversion Coating Applicator

U. S. Patent 2,854,371. *Sept.* 30, 1958. *S. Schjelderup, assignor to Shwayder Bros., Inc.*

A solution for treating articles formed of magnesium and magnesium alloys, comprising water; a chromate ion reagent in the proportions of 20 grams to 170 grams CrO_3 per gallon of water; barium nitrate present in excess of solubility; and a strong acid in sufficient amount to cause the pH to be between 0.9 and 2.5.

Paint Applicator

U. S. Patent 2,853,731. *Sept.* 30, 1958. *E. W Lancaster.*

An applicator for paint and the like comprising a back having first and second rectangular opposing surfaces and peripheral sides therebetween, a paint absorbing material having a pile on the first surface of said back, the second surface of said back being formed with means extending therefrom for gripping in the hand, at least one of said sides being straight and chamfered to slope inwardly from said second surface to form a sharp contacting edge having an angle of from 70° to 80° between said second surface and said chamfered side, whereby the pile material on said first surface will spread due to pressure in normal use beyond the edge of said first surface to a point substantially underlying said contacting edge, and said contacting edge will engage an adjacent wall with a line contact.

Phosphate Coating

U. S. Patent 2,854,367. *Sept.* 30, 1958. *B. S. Tuttle, W. A. Vittands and O. L. Walsh, assignors to Second Bank-State Street Trust Co.*

A composition for use in treating articles having a phosphate coating, consisting essentially of a water soluble stannous salt and from 0.1 to 50 parts by weight, based on the weight of 100 parts of the stannous salt, of a water soluble aliphatic poly-hydroxy acid having at least one carboxyl and at least two hydroxyl groups.

Phosphate Coating

U. S. Patent 2,854,368. *Sept.* 30, 1958. *L. L. Shreir.*

A solution for forming protective coatings on metals, comprising phosphoric acid of 1 to 8 moles concentration, and at least one tannin material in a proportion of between 1 and 35% by weight based on said solution.

Method of Jet Plating

U. S. Patent 2,854,387. *Sept.* 30, 1958. *E. M. Zimmerman, assignor to Philco Corp.*

In the jet plating of a metal deposit onto another surface involving directing a stream of electrolyte comprising an aqueous solution of salt of the metal to be deposited against the surface onto which the deposit is to be applied and completing the circuit between the jet device and the surface through the electrolyte stream whereby the said surface is the cathode and the jet device is the anode in the system, the improvement which comprises conducting such plating with a water-soluble ether dissolved in said electrolyte at a current density whereby the plated deposit has a cross-sectional area less than that of the jet orifice.

Printed Circuit Production

U. S. Patent 2,854,386. *Sept.* 30, 1958. *H. T. Lyman and H. J. Yanosik, assignors to Aladdin Industries, Inc.*

A method of photographically forming a conductive metallic pattern.

Electrodeposition of Copper-Tin Alloys

U. S. Patent 2,854,388. *Sept.* 30, 1958. *W. H. Safranek and C. L. Faust, assignors to The City Auto Stamping Co.*

In a process for electrodepositing a copper-tin alloy of over 15 percent tin from an electrolyte comprising a cuprous salt, a tin salt, and a cyanide selected from the group consisting of the alkali metal cyanides and ammonium cyanide, the improvement which comprises the steps of electrolyzing said electrolyte having added thereto at least 0.5 mole per liter of a halide selected from the group consisting of the alkali metal and ammonium halides, and replenishing said electrolyte with copper and tin by dissolution of a soluble copper-tin alloy anode containing more than 15 percent tin inserted in said electrolyte.

Bright Copper Plating Process

U. S. Patent 2,854,389. *Sept.* 30, 1958. *E. D. Boelter, Jr., assignor to E. I. du Pont de Nemours & Co.*

The method of producing bright copper plate which comprises electrodepositing the same at a current density of about 3-140 a./s. f. from an aqueous bath held at a temperature of 60-95° C., said bath containing 1-10 oz./gal. of potassium hydroxide, 0.5-2.3 oz./gal. of free potassium cyanide, 7-20 oz./gal. of copper cyanide, 2-50 p. p. m. of selenium supplied as copper selenide and at least 100 p. p. m. of a member of the group consisting of methylene-bis (naphthalene sulfonic acid) and the alkali metal salts thereof.

Pipe Plating Machine

U. S. Patent 2,854,395. *Sept.* 30, 1958. *F. J. Kennedy, assignor to National Electric Products Corp.*

An electro-plating apparatus for pipe and conduits.

Water Emulsion Paint

U. S. Patent 2,854,421. *Sept.* 30, 1958. *E. P. Wenzelberger, assignor to Midland Chemical Corp.*

A stable water emulsion paint composition consisting of a vehicle, pigment dispersed in the vehicle, and from 0.1% to 5.0% by weight on the paint weight of carboxymethyl dextran containing an average of 0.5 to 3.0 carboxylmethyl groups per anhydroglucose unit, the vehicle being selected from the group consisting of natural latex and aqueous dispersions of copolymers containing, in the copolymer molecule, a monovinyl aromatic hydrocarbon selected from the group consisting of styrene and nuclearly alkylater styrenes and from 40 to 60 mole percent of a diolefine selected from the group consisting of isoprene and butadiene.

Plating Thickness Indicator

U. S. Patent 2,854,626. *Sept.* 30, 1958. *M. Davidson and N. S. Rahal, assignors to the United States of America.*

Apparatus for measuring the thickness of conductive platings on a body by determining the difference in conductivity between the platings and said body.

Spraying Apparatus

U. S. Patent 2,854,946. *Oct.* 7, 1958. *E. O. Norris.*

Apparatus for spraying articles comprising a substantially closed stationary spray chamber, conveyor means for feeding articles to be sprayed into and out of said chamber on a horizontal path, a spray head disposed in said chamber above said conveyor means for directing a spray material onto said articles as they pass through said chamber, means including a movable wall, disposed above said spray head and covering the entire area above the path of articles passing through said chamber, to intercept spray particles in the zone above said articles and means for continuously moving said wall during spraying at a speed sufficient to remove said particles away from the zone above said articles before said particles agglomerate and drip onto said articles.

Brush Holder Attachment

U. S. Patent 2,855,123. *Oct.* 7, 1958. *E. E. Kintz.*

A brush holder attachment for containers having a bail and a beaded rim.

Electrostatic Spraying

U. S. Patent 2,855,245. *Oct.* 7, 1958. *J. Sedlacsik, Jr.*

Apparatus for electrostatic coating comprising, a support, an air intake line coupled to said support, or coating material intake line coupled to said support, an air passageway in said support communicating with said air intake line, a coating material passageway in said support communicating with said coating material intake line, a primary plastic tube communicating with said air passageway at one end thereof and with said coating material passageway at the opposite end thereof, a flexible electrical conducting member fixed to said support member at opposite ends thereof and extending through said tube, a plurality of nozzles connected to said tube and communicating with the interior of said tube, all adapted and arranged whereby air and coating material are mixed within said tube before passing outwardly through the nozzles of said plurality thereof.

Chromizing

U. S. Patent 2,855,332. *Oct.* 7, 1958. *G. A. Samuel, assignor to Metal Diffusions, Inc.*

The method of chromizing, which comprises reacting ammonium bifluoride with chromium in watery solution to form a complex ammonium chromium fluoride, with an excess of chromium, coating the watery dispersion thus formed on a ferrous metal article to be chromized, and heating the article with exclusion of air at a temperature of from 1650 to 1950 degrees F. for a time of at least three hours.

Chromium Plating Zinc & Lead

U. S. Patent 2,855,348. *Oct.* 7, 1958. *P. J. Topelian, assignor to Tiarco Corp.*

A method of chromium plating a metal object selected from the group consisting of zinc and lead comprising treating the object with a solution consisting essentially of chromic acid, phosphoric acid and hydrochloric acid in the proportions of approximately 36 to 44 ounces of chromic acid, 800 to 1200 cc. of 85% orthophosphoric acid and 700 to 1100 cc. of concentrated hydrochloric acid, rinsing, placing the object in a chromium electroplating bath, and electroplating with chromium.

Anodizing Aluminum

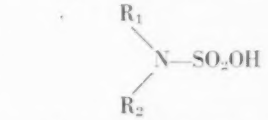
U. S. Patent 2,855,350. *Oct.* 7, 1958. *R. Ernst, assignor to Sanford Process Co., Inc.*

An electrolyte comprising an aqueous solution of an electro anodizing acid as the major acid component and 2-aminoethyl sulphuric acid.

Anodizing Aluminum

U. S. Patent 2,855,352. *Oct.* 7, 1958. *R. Ernst, assignor to Sanford Process Co., Inc.*

A solution of an electro anodizing acid as the major acid component and from about 0.02 to about 0.10 mol per liter of electrolyte solution of a compound of the group consisting of those of the general formula



and the soluble salts thereof, where R_1 and R_2 are each members of the group consisting of hydrogen, alkyl and cycloalkyl, each of R_1 and R_2 having less than 8 carbon atoms.

Deposit Thickness Tester

U. S. Patent 2,855,518. *Oct.* 7, 1958. *M. J. Foley and C. H. Perrine, assignors to Armco Steel Corp.*

In an apparatus for measuring the thickness of a metallic coating on a strip of base metal by the diffuse reflection of beta rays therefrom, a meter for measuring the reflection of said rays, means enforcing upon said strip a curved path, the convexity of which is disposed adjacent said meter, and the radius of curvature of any element of said curve being at least 500 times the maximum thickness of the said strip, and means for maintaining the locus of said path at a fixed distance from said meter.

Paint Drip Tray

U. S. Patent 2,856,095. *Oct.* 14, 1958. *F. C. Schnabel*

The combination with a paint can of a hollow substantially frusto conical

tray open at both ends, said tray at the smaller end thereof being integrally formed with an outwardly extending flange adapted to be received under the inwardly extending rim of the paint can.

Pickling Refractory Metals

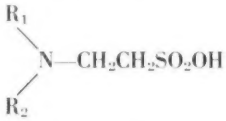
U. S. Patent 2,856,275. *Oct.* 14, 1958. *G. F. Otto, assignor to Amchem Products*

In the process of finishing the surfaces of articles composed at least in major part of a metal selected from the class which consists of titanium and zirconium by treating such surfaces with an acid pickling bath to remove oxide film and scale, the improvement which consists in adding to an aqueous pickling bath containing an acidic agent which consists of hydrofluoric acid in an amount equal to from 1% to 6% by weight of the solution mixed with nitric acid in an amount equal to from 10% to 50% by weight of the solution, a minor amount ranging from 0.15% to 5% by weight of the solution of an agent selected from the class which consists of the chlorides of sodium, potassium and ammonium; the chlorates and hypochlorites of sodium and potassium; peroxide of hydrogen; and mixtures of the same, and subjecting the article to be treated to contact with the liquid so prepared under time and temperature conditions sufficient to remove said scale and film.

Anodizing Aluminum

U. S. Patent 2,855,351. *Oct.* 7, 1958. *R. Ernst, assignor to Sanford Process Co., Inc.*

An electrolyte comprising a solution of an electro anodizing acid as the major acid component and a compound of the group consisting of those of the general formula



and the soluble salts thereof, where R_1 and R_2 are each members of the group consisting of hydrogen, alkyl and cycloalkyl, each of R_1 and R_2 having less than 8 carbon atoms.

Corrosion Preventive

U. S. Patent 2,856,299. *Oct.* 14, 1958. *R. A. Westlund, Jr., assignor to Esso Research and Engineering Co.*

A liquid rust preventative composition comprising about 75 to 99 parts of an oleaginous base, about 0.5 to 15 parts of a partial ester of a fatty acid having about 12 to 22 carbon atoms per molecule and an aliphatic polyhydric alcohol having about 3 to 12 carbon atoms per molecule, and about .1 to 10% of a water displacing agent.

Vacuum Metalizing Quartz

U. S. Patent 2,856,313. *Oct.* 14, 1958. *P. D. Gerber and W. Schafer, Jr., assignors to the United States of America*

A method of plating quartz crystals, comprising the steps of heating the crystal to be plated to a temperature in the range between 500°C. and the inversion temperature of said crystals in an evacuated chamber, plating said heated crystal in said evacuated chamber, and heat treating said plated crystal in said evacuated chamber at a temperature within said range.

Phosphate Coating

U. S. Patent 2,856,322. *Oct.* 14, 1958. *R. A. Parson and J. Truhlar, assignors to Pullman-Standard Car Mfg. Co.*

The method of providing a permanent iron phosphate coating of a weight in excess of one hundred milligrams per square foot on a ferrous metal surface, which comprises subjecting the metal defining the surface for a period of from about one minute to about forty minutes to the action of a solution consisting essentially of a quantity of an acid pyrophosphate selected from the group consisting of the sodium, potassium, lithium, ammonium, and amine pyrophosphates and mixtures thereof to provide a concentration of pyrophosphate ions from about 0.5% to about 5%, said solution having a pH between about 1 and about 7 and a temperature between about 130°F. and about 200°F.

Paint Composition

U. S. Patent 2,857,347. *Oct.* 21, 1958. *J. W. de Groot, Jr. and B. F. Hofferth, assignors to Armstrong Cork Co.*

A paint composition comprising filler, pigment, solvent, and a vehicle comprising about 90%-70% by weight vinyl toluene-siccative oil coplymer, and about 10%-30% by weight nondrying alkyd resin comprising the reaction product of about 40-90% by weight of a nondrying glyceride oil with a polyhydric alcohol and an aromatic dibasic acid, wherein the hydroxyl equivalents of said alcohol are in 10-30% excess of the carboxyl equivalents of said acid.

ABSTRACTS

Relative Advantages of Wet and Dry Hot-Dip Galvanizing Processes

E. C. Mantle and P. Hoesli: Paper read at the 5th International Galvanizing Congress, Holland.

The authors presented a survey of the most important hot-dip galvanizing methods in use, including the operating data obtained from 17 concerns. The data obtained showed that, with tanks, cylindrical bodies and similarly shaped parts, the old dry process utilized the zinc better than the other galvanizing processes. The hard zinc production was approximately in the same ordered amount as with the new dry zinc galvanizing. It is suspected that, with the reaction between the fluid zinc and iron salts, the iron-zinc particles formed are partly retained in the zinc coating and do not settle out as hard zinc, at the bottom of the galvanizing kettle.

The wet galvanizing process appears to be very suitable for domestic utensils (hollowware) although there is a possibility of corrosion by flux residues.

The dry galvanizing process requires more steps than the others; however, the number of man-hours required with the process, in general, is not greater. The work-loading per man and per hour is more dependent on the organization of the operation than on any particular galvanizing process.

A simple differentiation between the two processes (wet and dry galvanizing) can be made by means of the absence of aluminum (wet galvanizing) and by the addition of this metal (0.1-0.15% Al) in dry galvanizing. Zinc coatings which are obtained by the dry process have no iron-zinc alloy layer and are thinner, while parts obtained by the wet galvanizing process have this alloy coating together with a thicker zinc coating. An influence is also obviously exerted in this connection by the composition of the steel and the dip time.

In Germany, in the galvanizing of domestic utensils, a coating thickness of zinc equivalent to 300-350 g./m.^{2} is applied while in Great Britain the coating thickness amounts to about 400-500 g./m.^{2}

The Cook-Norteman and Sendzimir Hot-Dip Galvanizing Processes

H. Bablik; Paper read at the 5th International Hot-Dip Galvanizing Congress, Holland.

In the Sendzimir process which was first introduced in 1931 and has since been further developed, the steel strip to be galvanized is passed into the zinc bath at a temperature of 470° to 480° C. In the Cook-Norteman process, which has only been introduced to industry during the last few years, induction heating in ceramic galvanizing kettles is utilized. With the Sendzimir process, the maximum throughout amounts to about 20 tons/hour while, with the Cook-Norteman process, it is easy to obtain a throughput of 50 tons/hour.

It is a noteworthy fact that, since 1936, a total of 30 Sendzimir installations have been placed in operation, with another in construction in Germany at the August-Thyssen steelworks, Duisburg. At the moment, six steel strip plants are galvanizing by the Cook Norteman process while, in 18 other plants, other methods are used for continuous steel strip galvanizing.

The author investigated test sheets of similar composition from 12 different firms in Belgium, France, Great Britain, Italy, Canada and the U.S.A. With these samples, 10 of the producers were using the Sendzimir process, and two concerns the Cook-Norteman process. The investigations were conducted on a broad basis and comprised analyses, metallographic and mechanical testing, as well as a series of special tests. It was found that the galvanized steel sheets deviated only slightly from one another in their important characteristics. The steels were very fine grained, because of the high degree of cold-rolling reduction given. No differences were found in the mechanical properties of the sheets galvanized by these two processes.

For the 12 samples investigated, the thickness of the zinc coating varied from 120-200 g./m.^{2} In some cases, considerable differences were established between the upper and the lower sides. As the thinner coating is the one which decides the life, the thicker coating on the one side, has no practical value. The motor-driven extraction rolls used with the Cook-Norteman process give greater differences in coating thickness than in the Sendzimir process. Variations in the thickness of the alloy coating can be ascribed to varying Al content in the zinc bath.

Detoxification of Cyanide Waste Waters

B. Wedekind; *Metall* (Germany), **12**, No. 6, 518.

Rinse waters from metal finishing plants contain on an average, 50-100 mg./l. cyanide; concentrations of up to 500 mg./l. are occasionally met with.

Detoxification is obtained by oxidation of the cyanide to the relatively non-toxic cyanate. Solutions of sodium or magnesium hypochlorite serve as the oxidation medium. At pH 8.5, the reaction requires a period of about 1-2 hours but, at pH values over 10, it is completed within a few seconds. The speed of the oxidation reaction is dependent on the type of heavy metal present; however, with pH values around 10, the detoxification requires less than 1 minute with almost all complexes.

Small plants can avoid the expense of continuous and automatic detoxification. In this case, the destruction of the cyanides is conducted in a collecting tank. Continuous detoxification is a more efficient process where the scale of operations warrant the necessary plant installation. Here again, a manually controlled plant will usually be sufficient, particularly if the cyanide concentration is low and varies only within narrow limits. The test for absence of cyanide can be made with pyridine-benzidine by the Aldridge colorimetric method.

With the new development work of the German Degussa concern, it is possible to operate the cyanide detoxification as a full-automatic process. The control is a silver-calomel electrode at which an electrical potential is formed proportional to the cyanide concentration. Indicating and control equipment can then be operated from this potential, by means of amplifiers. Regulating valves automatically control the run-in of the hypochlorite solution. In order to prevent disturbances by fouling of the surface of the silver electrode, and auxiliary platinum electrode is coupled with this, at which a potential opposing the measuring electrode is set up by means of an auxiliary circuit. A depolarization current flows in this auxiliary circuit, whose current density must amount to about 1-2 micro amp./cm.^{2} As the detoxification is conducted at a pH value of 10, all the heavy metals are finally precipitated as hydroxides. Only zinc hydroxide redissolves somewhat. These heavy metal hydroxides are separated out, before discharging the effluent by means of suitable filtering equipment.

Tungsten Plating from Aqueous Solutions

H. J. Boosz: *Metall* (Germany), **12**, No. 6, 508.

Deposition of tungsten is difficult, and many variable and conflicting statements are given in the technical literature regarding the plating conditions, current efficiency, nature of the deposit, etc. However, it is fairly well agreed that, although deposition of pure tungsten is very questionable, it is possible to deposit alloys with the metals of the iron group.

Best results are obtained from plating baths which contain citrates, borates, or tartrates, in addition to salts of the iron metals. The presence of aluminum, arsenic, manganese, chromium, and magnesium in the electrolytes, appears to inhibit the tungsten deposition almost entirely. The cathode material is also an influence. Thus, for example, no deposition occurs on tungsten but, on the other hand, adherent coatings are obtained on nickel, iron, tantalum, and platinum.

The cobalt-tungsten alloys appear to be the best to deposit and have satisfactory properties. The bath is operated at a pH of from 5.5 to 7.5 and at a temperature of 80-102°C. Lowering the pH reduces the tungsten content in the deposit, and lowering the bath temperature reduces the current efficiency. The maximum tungsten content in the deposit is about 50 to 60% and the current efficiency is a maximum of about 30%. The cathodic current density is 2-20 amp./dm.^{2}; the current efficiency is generally better at the lower current densities.

The ammoniacal and carbonate—containing baths have also been investigated. In the ammonia-alkaline baths, current efficiencies of 34% have been achieved; the current efficiency for the carbonate-containing baths is very small.

With regard to the quality of the deposits, the cobalt-tungsten alloys are adherent and resistant to corrosion by hydrochloric acid, sulfuric acid and nitric acid.

Recent Developments

NEW METHODS, MATERIALS AND EQUIPMENT
FOR THE METAL FINISHING INDUSTRIES

Chromate Conversion Coating

Kosmos Electro-Finishing Research, Inc., Dept. MF, 140 Liberty St., Hackensack, N. J.

Ker-Chro-Mite "P", a chromate conversion coating supplied in powder form, produces lustrous or colored protective coatings for zinc or cadmium, requires only a few ounces per gallon for makeup, and little, if any, control thereafter. It is excellent as a base for paint, for zinc plate, cadmium plate, zinc die castings, copper or brass finishes.

"Canned" Filter Pump

Sethco Mfg. Corp., Dept. MF, 2284 Babylon Turnpike, Merrick, N. Y.

Especially recommended for filtering solvents, ultrasonic cleaners, and precious metal solutions, these SEI series "canned" filter pump units are fabricated entirely of stainless steel 304, with the pump, motor, filter chamber and filter tube all housed in one compact unit.

Similar to the manufacturer's other "canned" filter units, a principal feature of the new series is a pump which is inside a motor housing and magnetically driven by the motor. Stuffing boxes, rotary seals, shaft wear, coupling and alignment problems are eliminated. The results are long leak-proof, maintenance free operation. Motor windings are isolated from pumping chamber by a stainless steel liner. Pump is driven by a 1/8 h.p. totally enclosed 110v, 60 cycle, 1 phase motor supplied with a thermal starting and overload relay.

In line with the pump and motor is an all stainless filter chamber which contains one or more filter tubes of multi-layered processed cotton or special Dynel yarn, providing effective depth filtration of solutions down to 1 micron in size. Gold, silver palladium and precious metals are easily reclaimed simply by igniting the filter tube. Filter tubes are also available in porous stone or porous carbon.

Spotting-Out Preventive

Enthone Inc., Dept. MF, 442 Elm St., New Haven, Conn.

A tarnish and corrosion inhibitor which minimizes spotting-out, and called Entek CU-55, reacts with copper and copper alloys to form an invisible coating which prevents staining, green salt formation, finger marking, pit corrosion and spotting-out under high humidity storage conditions.

The product is a non-toxic liquid which does not contain chromates. It is added to water at a concentration of 1% by volume and may be used hot or cold. One gallon will treat 500 sq. ft. of metal surface.

Copper and brass surfaces treated with the process will withstand 200 hrs. exposure to 100% humidity at 100°F without loss of luster. The treatment improves the solderability of copper and brass and increases the adhesion of lacquers and enamels. It protects steel coated with thin deposits of copper or brass from rusting in storage.

Rack Stripping Gun

Incar Inc., Dept. MF, 11480 *Lakeside Ave., Cleveland* 14, *Ohio.*

The Strip Gun mechanically cuts plated deposits from straight tips of

plating racks without cutting into the tip material or flattening out the tip. The cutting head portion of the gun revolves at speeds above 5,000 r.p.m., which enables the cutting blades (special carbide) to operate efficiently without lubrication. The blades are replaceable and interchangeable between cutting heads varying in size from $\frac{1}{16}$" to $\frac{5}{32}$". The normal life of the cutting blades is approximately 5 months.

A further advantage of the device is obtained by inserting stops in the rear of the cutting heads. With the stop inserted, the cutting head removes the plated material to a predetermined point. In the case of new racks, the stop is inserted and the cutting head is used to remove the rubber insulation. The same length stop then remains in the cutting head when cleaning plated material from the tip, and the tip is always cleaned to the same distance from the end of the tip.

The gun can be provided as either a pneumatic or electric combination of driver and cutting head. In some cases the cutting head alone can be used with existing drivers, provided they have operating speeds above 5,000 r.p.m. Field trials have shown that an average 30 tip rack can be completely cleaned in as little as 5 minutes.

Cyanide Copper Brightener

Allied Research Products, Inc., Dept. MF, 4004 E. Monument St., Baltimore 3, Md.

Isobrite 623 is a "one-shot" brightener which gives the advantage of operating either as a semi or full bright

solution, depending upon the type of work to be run. It can be used in either rack or barrel plating and is easily controlled to produce any desired level of brightener by using just the single addition agent.

Over steel, zinc die castings or brass or bronze parts, the addition produces a copper film that can be bright nickel plated without the need for buffing if the finish of the original material permits.

The new brightener is packaged in four one-gallon cartons to a package and is used without dilution in the ratio of ½% by volume to plating solution.

In addition to the brightener, a Rochelle salts replacement is available, Isobrite 630, which increases cathode and anode efficiency and ties up most impurities including hard water salts.

A complimentary product for chrome reduction, Isobrite 631, is also available, which is highly efficient in immediately reducing high chrome contamination or can be used as a maintenance addition to keep chrome contamination under control.

These three products insured trouble-free operation for all types of copper plating.

Abrasive Blast Nozzle

W. W. Sly Mfg. Co., Dept. MF, Cleveland 1, Ohio.

For shot, grit and sand blasting, the new "Uniflo" nozzle retains its original orifice size longer, thereby keeping the blast concentrated to speed cleaning and save compressed air. Its long life insures uninterrupted production, without frequent nozzle changing. The nozzle liner is tungsten carbide, and the jacket is Kirksite, a shock-resisting alloy of zinc, aluminum, copper and magnesium.

The nozzles are equally effective in hand blasting, cabinet and barrel operations. Orifice sizes are: $\frac{3}{16}$", ¼", $\frac{5}{16}$", $\frac{3}{8}$", $\frac{7}{16}$" and ½". A ¾" size is also available.

The nozzle is claimed to give at least 200 times longer life than an ordinary hard iron nozzle, and to cost 20% to 48% less than other nozzles in its quality class. Nozzles can be supplied with convenient-to-use nozzle holders.

Hot Dip Plastic Coating

Fidelity Chem. Prod. Corp., Dept. MF, 470 Frelinghuysen Ave., Newark, N. J.

An odorless, crystal-clear plastic coating, Dip-Pak No. 815, leaves a rust-preventative oil film on metal when stripped away. It is very stable under prolonged heating, resists darkening, emits no odor during the coating process, melts at 375°F., and is ready for use at 350°F. to 360°F. Parts protected by the coating showed no corrosion after 16 hours, 100°F., 100% relative humidity, 3 hours at —40°F., 2 hours at 160°F., and 3 hours in 5% NaCl solution, it is claimed. Because of its stability, it will stand up under prolonged heating and reheating.

The materials are shipped as solid plastic blocks which are melted in an electric or oil jacketed pot just before application. The part is then dipped into the molten plastic, withdrawn, and allowed to cool. The entire operation takes only seconds and the metal object is completely coated with a tough, abrasive, moisture-resistant, shock-resistant, transparent film. After shipment or storage, the coating can be removed easily by slitting with a sharp blade and peeling.

Planning A New Production Line *to trim costs?*

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A guide to . . .
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DRYING • BLACKENING • PHOSPHATIZING
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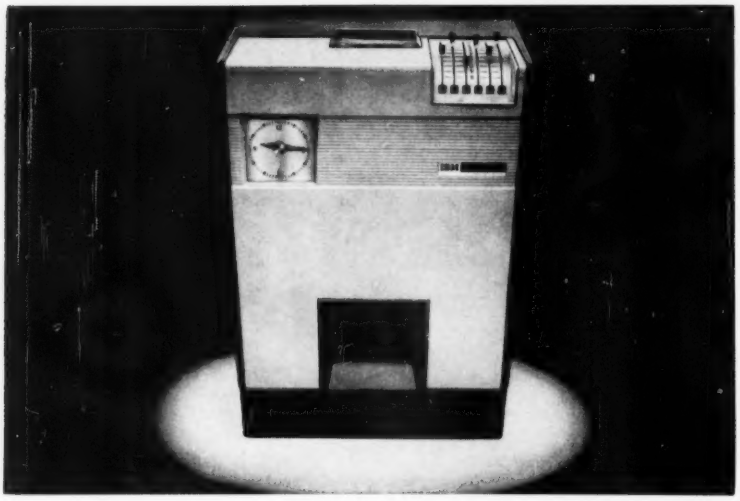

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Barrel Finishing System

Almco, Queen Products Div., King-Seeley Corp., Dept. MF, Albert Lea, Minn.

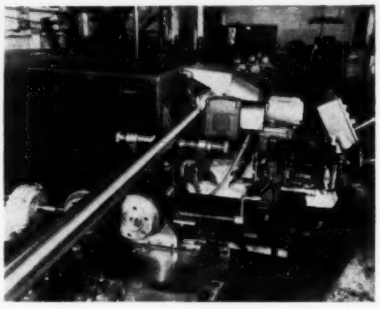
With a new, inexpensive, precision deburring and finishing system, called Roll barrels, deburring and finishing departments can now produce better parts at a fraction of the previous time and cost. The barrels are ideal for processing a variety of parts in small or large lots. They provide a large capacity operation in an unusually small floor area. Using two machines, one operator can continuously process up to 12 different barrels full of parts at the same time.

The machines use an open system of parallel rubber covered rollers powered by a variable speed electric motor. Small barrels with flanges are simply placed on, and are rotated by the powered rubber rollers. Barrel rotation speed is determined by motor speed and size of barrel. Nine barrel sizes are available and barrel speeds of 17 to 65 rpm are obtained. Parts and media are loaded and unloaded in a special, convenient separating cabinet. Barrels are lifted on and off the continuously moving rollers with a simple, built-in mechanical hoist boom.

These machines are available as single row or double row units depending on floor space requirements.

Centerless Belt Polisher

Engelberg, Inc., Dept. MF, 831 W. Fayette St., Syracuse 4, N. Y.



Designed for heavy-duty precision grinding and finishing of rod or tube stock, this new Model #8132-HD features a large workpiece capacity, a powered outboard support package, and an automatic reverse-feed mechanism. It will accommodate stock from 1″ to 9″ in diameter, and up to any length. Average through-feed rates at a 4 degree helix angle setting of the regulating wheel and power feed stands vary from 2½′ to 20′ per minute.

The machine is equipped with a power infeed control synchronized with the power feed stands to provide correct alignment and proper work height when changing from one diameter to another.

Abrasive belt size is 8″ x 132″, with belt speed of 4500 sfpm. The machine is equipped with air-belt tensioning, a 50 h.p. belt drive unit with all electric controls, and a complete recirculating system of 200 gallon capacity with ½ h.p. coolant pump. Regulating wheel is 13″ diameter, 8″ wide.

Metal Cleaning Detergent

Rohm & Haas Co., Dept. MF, Washington Square, Philadelphia 5, Pa.

Metal cleaning in soak tanks is due to become a much more efficient process than ever before, it is claimed, as a result of a new detergent known as Triton QS-15. It combines vigorous detergent action with solubility in rela-

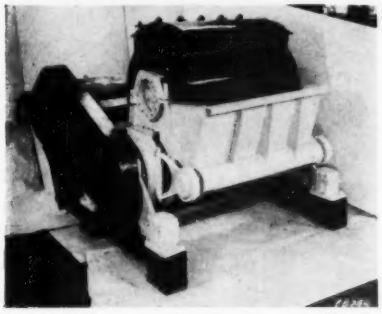
tively high concentrations of alkaline cleaners, while at the same time exhibiting chemical stability in strong caustic.

The product is anionic under alkaline conditions and cationic under acid conditions and hence amphoteric. It is 100% active ingredient.

Vibratory Finisher

Productive Equip. Corp., Dept. MF, 2926 W. Lake St., Chicago 12, Ill.

The Selectro Vibro-Finisher is a four bearing positive eccentric, oil splash lubricated vibrator assembly with an adjustable stroke in eight settings from



0 to $\frac{3}{8}$" in amplitude (patented). It is equipped with a variable speed drive to operate at speeds from 1200 to 2000 rpm. The hopper has a plasticized liner and is equipped with a geared handle for ease in dumping or flushing. All units are equipped with a vented cover and flushing panel. Sizes are from 1 cu. ft. to 20 cu. ft. capacity. A screen for separating media from parts, and activated by the vibrator, is available as optional equipment. Sectional drums also available.

Reducer for Baking Enamels

Potter Paint Co., Dept. MF, Cortland 39, N. Y.

A unique blend of solvents for reducing synthetic baking enamels is different from straight solvents such as xylol, toluol, etc., as up to 100% more of it can be used in relation to the enamel and still maintain equal mileage and film thickness, according to a statement of the makers.

The product, Hi-Sol Enamel Reducer, achieves this result because the lower viscosity resulting from increased reduction permits dropping air pressure and holding the gun closer to the work. More paint solids, therefore, are deposited on the product with less loss due to overspray. In electrostatic applications the lower viscosity provides greater "wrap-around," placing more paint on the object to be painted.

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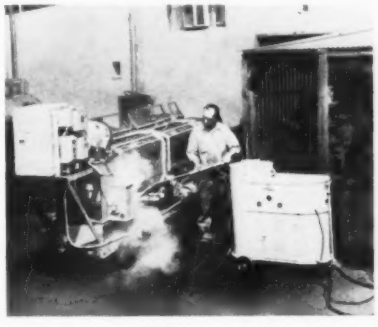
PROVIDENCE 3, R. I. — 425 Richmond St. — JAckson 1-4100

Steam-Jet Cleaner

Pantex Mfg. Corp., Dept. MF, Pawtucket, R. I.

Identified as the Speedysteam "100," this advanced-designed unit provides automatic operating convenience and



economy available only with higher-priced models, according to the manufacturer. The unit is priced under $500 f.o.b. the factory.

Mounted on four large, rubber-tired wheels, the new cleaner is a completely enclosed, compact machine with built-in soap tank and controls. It can be operated on kerosene or #1 or #2 fuel oil. Ignition is fully automatic and fuel pressure is modulated to develop the gun-nozzle pressure desired, as shown on an easily visible gauge. Heating coils are $\frac{1}{2}$-inch in diameter, continuous wound for maximum efficiency and tested for 1,000 psi. Also, as standard equipment, the machine incorporates a water float tank with an anti-siphon valve. This assures uniform water flow and, at the same time, avoids

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danger of supply contamination, as required by law in many states.

The snap of a switch and the opening of only one valve produces adjustable, automatically controlled cleaning pressures from 50 to 150 psi. in 90 seconds. Delivery at 100 gph. is accomplished with a quiet rotary, valveless pump which eliminates all pulsation and vibration.

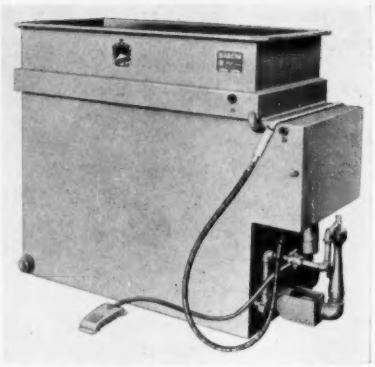
Soap tank has a 5-lb. dry capacity. No pre-mixing is necessary and normal operation, with one filling, is 6 to 7 hours. The unit is equipped with a ½ hp. heavy-duty motor, 20 ft. of wire-braided ½-inch steam hose and racks for hose and power cord. The cleaning gun is fully insulated and designed for ease of handling.

Vapor Spray Degreasers

Baron Industries, Dept. MF, 241 West Avenue 26, Los Angeles 31, Calif.

A new "Baronet" standard series of trichlorethylene vapor spray degreasers consists of 5 models. Interior lengths range from 3 to 8 ft., while the inside depth and width of each is a uniform 24" x 24". While occupying a minimum of floor space and weighing as little as 400 lbs., the degreasers will efficiently handle a work load capacity of from 1600 to 2000 lbs. per hour, depending upon the size of the unit, it is claimed.

Constructed of heavy gauge steel, with corrosion resistant phenolic coating, each unit boasts a heavy duty galvanized work rest and water jacket that completely encircles the degreaser. The auxiliary copper finned tube condenser combines with the water jacket to automatically reclaim dirty solvent.



Standard equipment includes special leakproof pump and water separator, foot switch and aluminum spray lance. In addition, each machine is equipped with the new Econ-O-Lid, which enables the degreaser to be kept closed except during loading and unloading operations. The manufacturer states that solvent consumption is reduced up to 60% with this unique cover roller. The degreasers stand 46" high, 30" wide, with overall lengths ranging from 52" to 112". Completely assembled for immediate shipment, these 5 units are available in gas, steam or electrically heated models to suit any installation requirement. Prices range from approximately $500 to $1000.

Bright Gold Process

Paul T. Smith Co., Dept. MF, Providence, R. I.

A unique salt is incorporated in a gold electroplating formulation, to produce brilliant 24 karat electrodeposits to any specified thickness. The deposits are many times harder than conventional 24 karat gold electroplates, showing hardness reading values of 245-260 Knoop, it is claimed.

Neither cyanide, cyanide related products, nor acids are used in the "Brilliant Gold" process. The salt and the plating solution are non-toxic, and the bath operates at a wide mildly alkaline pH range between 8.0-11.0. Cathode current efficiency of 100% is realized in both still and barrel plating operations.

The crystal structure is entirely new and different than any ever examined before, and sections can invariably be identified and separated from conventional gold electrodeposits. The bath is most economical to install since only

8.0-10.0 pennyweight of fine gold are required to initiate a new solution and no special tanks and equipment are needed.

Sweat Absorbers

Mine Safety Appliances Co., Dept. MF, 201 North Braddock Ave., Pittsburgh 8, Pa.

Coolband is held in place on the wearer's forehead by an elastic band and does not interfere with glasses or goggles. Cool-Ur-Hat is designed for use with safety hats, welding helmets, and face shields. A non-metallic (plastic) fastener folds over the head band of the hat and snaps in place to keep the sponge absorber in a fixed position.

Both sweat absorbers are made of soft, light, highly absorbent cellulose sponge which clings without binding. Evaporation from the exposed surface aids in cooling the head.

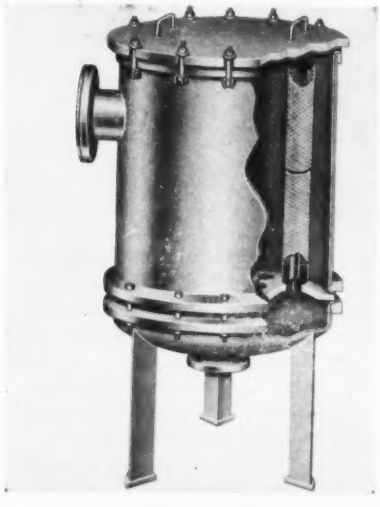
Solution Filter

Commercial Filters Corp., Dept. MF, 2 Main St., Melrose, Mass.

A new rubber lined steel Fulflo Filter for electroplating features a swing-bolt cover to simplify replacing of elements, and a center bottom outlet to facilitate cleaning. The cover is removed simply by loosening bolts, swinging them out of the way, and lifting cover off. Honeycomb filter tubes are then completely accessible for changing.

Bottom outlet allows for quick, easy cleaning of entire vessel, simply by addition of a "T" connection, with drain valve.

Choice of filter tubes includes cotton fibers with pure nickel or stainless steel cores for acid solutions, and plain steel (or non-metallic) cores for cyanide solutions. Filter tubes are also produced in Nylon, Orlon, Dynel, acetate or glass fibers.



The new filter is available in six sizes for capacities up to 18,000 gph. Other models are designed for larger capacities. Plain steel or stainless steel containers are also available.

Solution Filter

Chem Flow Corp., Dept. MF, 128 Dell Glen Ave., Lodi, N. J.

A new type of filter assembly completely resistant to chemical attack and featuring excellent filtering characteristics at extremely low pressure drop, is constructed of Pyrex brand tubing and Teflon. The extremely hard, permanent filter element offers maximum particle retention with very high flow rates over a complete porosity range of one to 100 microns. With proper care and cleaning methods the constant replacement of non-permanent elements is completely eliminated.

The filters are designed for inline installations, and are available in either angle or "Y" types, completely assembled and ready for operation. Bodies are transparent Pyrex tubing. Both types feature end plate assemblies of Teflon lined steel for conveniently servicing the unit and for periodic removal of the element for cleaning. Operating pressures are up to 50 psi; maximum operating temperature is 150°F with the unit able to take a

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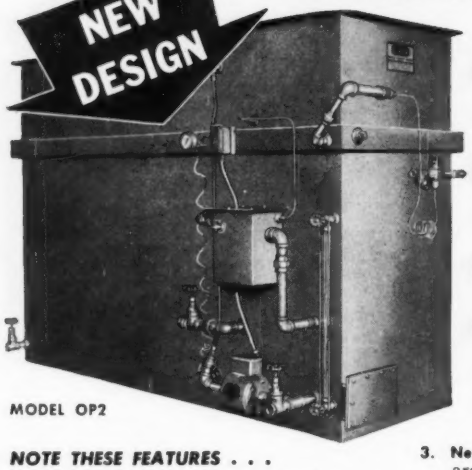
CIRCO DEGREASERS

NEW DESIGN



MODEL OP2

- **Will last twice as long!**
- **Reduce solvent costs 30% or more!**
- **Cut labor costs!**
- **Up to 40% less maintenance!**

NOTE THESE FEATURES . . .

1. **Unobstructed tank walls.** Condensing coil and condensate pan are recessed providing superior vapor control, effective solvent reclamation and unobstructed working area.
2. **Demand type water control.** Insures using water only when needed, thereby reducing operating cost. Placement of nickel plated condensate coils in conjunction with new type water control eliminates water condensation along the sidewalls of degreaser, thus, preventing rusting of the sidewalls and acid solvent, increasing the life of the degreaser.
3. **New pump design.** All pump parts are fabricated of stainless steel. The rotor and end plates are nickel clad. Rotating magnetic field drives impellor, thus, the pump is completely sealed except the intake and outlet, preventing leakage.
4. **Lower height.** Working height reduced for easy operation.
5. **Built-in storage tank.** Holds adequate reserve for flushing in addition to entire contents of degreaser sump.
6. **Less floor space.** Designed to operate from either side.

SINCE 1923

CIRCO

EQUIPMENT COMPANY

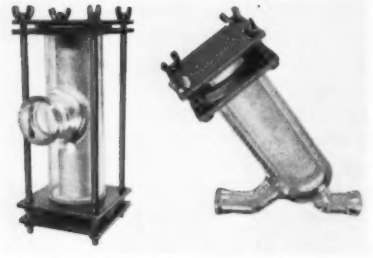
OVER 208 STANDARD MODELS... including Circosonic ultrasonic degreasers. All backed by nation-wide technical field service.

YOUR INQUIRY BRINGS comprehensive 32-page vapor degreasing manual.

122 Central Avenue, Clark (Rahway), New Jersey Offices in principal cities

PER-SOLV (Perchlorethylene) **CIRCO-SOLV** (Trichlorethylene)

Vapor and Ultrasonic Degreasers • Metal Parts Washers • Dryers • Solvent Recovery Stills



Angle (left) and "Y" Types, FPT Filters

sudden temperature differential up to 200°F.

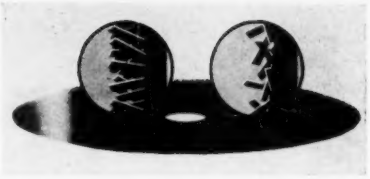
Coated Abrasives

Abrasives Co. of America, Dept. MF, 492 Main St., Fort Lee, N. J.

Up to 200% longer life, 2 to 4 times greater particle density, and more efficient cutting because the sharpest edges of the abrasive particles are always exposed, are claimed for new coated abrasive discs.

Feature of the "Magnecoating" process is magnetic orientation of the abrasive particles so that they are firmly embedded in the adhesive coating with the sharpest points upwards, assuring the maximum number of exposed cutting edges. Because of this orientation, a dense and efficient coating of the entire disc surface is assured. Excess loose particles are removed from the coated disc by magnetic force, leaving a clean, sharp cutting surface.

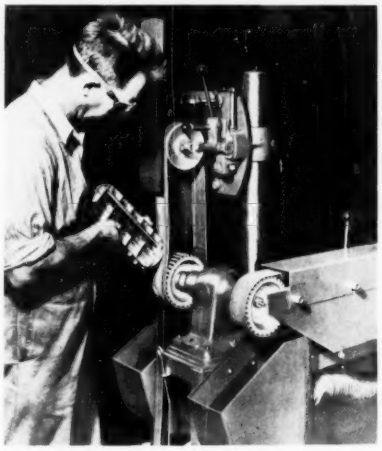
Discs are available in standard grits for all normal grinding and finishing operations. For general industrial use on heavy metals, discs are provided in 16 through 100 mesh; for sheet metal work, from 24 through 180 mesh; open coat discs for use on soft and semi-soft metals are made from 16 through 100 mesh; silicon carbide discs for use with ceramics, glass, wood, and other special materials are available from 16 to 600 mesh. All discs are made in two size, 7" and 9⅛" diameter, with either ½" or ⅞" hole.



Belt Polishers

Rockwell Mfg. Co., Walker-Turner Div., Dept. MF, 400 N. Lexington Ave., Pittsburgh 8, Pa.

In addition to the four standard setups of this complete line of versatile, low-cost 2½-inch belt grinders, single horizontal, double horizontal, horizontal and vertical, and double vertical, a variety of accessories are available which make it possible to build low-cost special job setups. These accessories include: vertical support unit, safety guards, dust and chip chute, fully adjustable platen, dust collector and an adjustable tool rest for grinding. A 4-inch backstand idler is also available for use with a polishing lathe.



Engineered for long life and accurate work the new machines feature lubricated-for-life, double-sealed, pre-loaded ball bearings; precision bored seats,

precision ground shafts, and dynamically balanced arbor pulleys.

Standard equipment includes the arbor head, rubber contact wheel, 2¾-inch backstand idler unit and an abrasive belt. Belt speed is 5400 f.p.m. with 6-inch contact roll using standard 1725 motor.

Price, without motor and switch, for the single horizontal setup is $129.50.

Anodic Coating Thickness Tester

The Dawson Corp., Dept. MF, 302 Fifth Ave., Pelham, N. Y.

With the unit illustrated, the break-down voltage can quickly and simply be measured and the deposit thickness can be calculated therefrom. The deposit thickness for pure aluminum and a number of alloys can be read directly in microns from the scale.

On the front plate are mounted a regulating knob with measuring scales in volts and microns, control lamps for mains and break-down voltage, as well as mains switch and fuse. The test knob is provided with insulated test points.

Automatic Wet-Blast Machine

Hydra-Blast Mfg., Div. Automation Services, Inc., Dept. MF, Detroit 38, Mich.

A newly developed automatic wet-blast machine for the removal of light flash and burrs from die-cast name plates and other similar parts has been placed in operation. This machine features stainless steel construction, with no pumps or moving parts in its blast circuit. The new equipment eliminates tedious manual operations. It also incorporates a complete process cycle including automatic un-load and oxidation-inhibition in its final stage.

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THE PLATING INDUSTRY
For Quality, Efficiency, Low Cost Operations
OVER 100,000 INSTALLATIONS
For alkaline or acid heating jobs, you can depend on
CLEPCO ELECTRIC IMMERSION HEATERS
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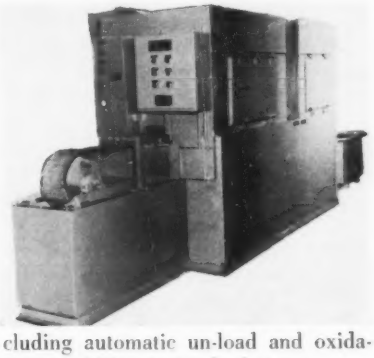

Ultrasonic Cleaning Unit

Blackstone Corp., Dept. MF, Jamestown, N. Y.

A new large capacity ultrasonic cleaning equipment is available with custom-built stainless steel cleaning tanks. The Model GW-8 has an electronic generator separately housed in a cabinet 25" x 25" x 33" high. The cleaning tank, of the equipment illustrated, is 30" x 12" x 12" deep.

The entire tank of cleaning solution is uniformly activated by four multi-element transducers constructed from over 1,000 separate magnetostrictive strips operating at 20KC/second. This highly efficient transducer is air cooled, designed to radiate heat. In continuous operation it will not over-heat low-boiling, low-flash, flammable or toxic solvents. The high thermal stability of the nickel elements from which it is constructed makes it possible to use solv-

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If you are a coating user, you will want to learn more about how a unique Nacromer coating will help your sales. To obtain additional information, mail the coupon below. Do it today.

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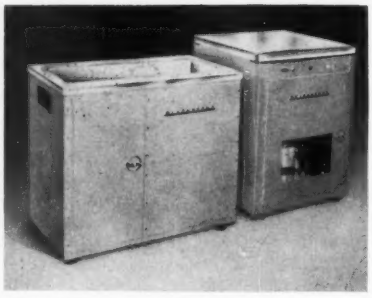


ents at elevated temperatures up to 400°F.

Ammeters and Shunts

Rectifier Mfg. Div., Clinton Supply Co., Dept. MF, 110 S. Clinton St., Chicago 6, Ill.

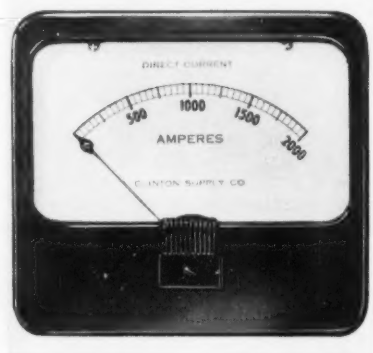
Dependable d'Arsonval moving-coil d.c. ammeters and voltmeters are now made available with exclusive rear-screw "Cal-Adjust" which facilitates initial installation, saves time and cost in re-calibration.

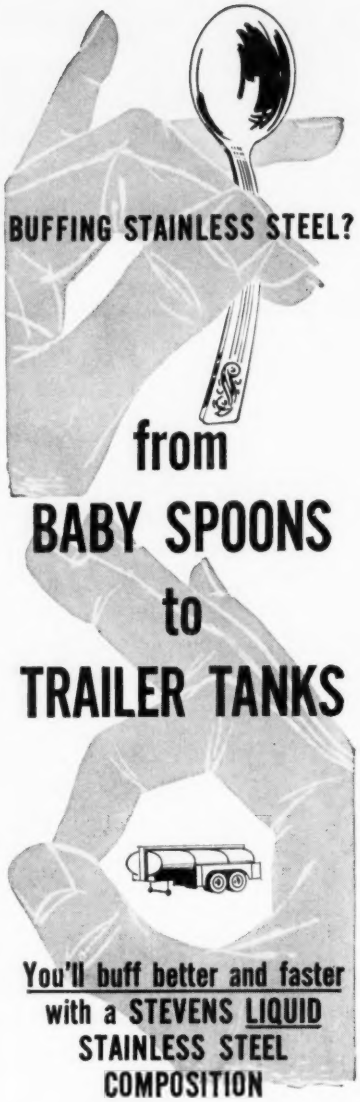
Simply by turning two screws at the rear of the meter case, one can vary the meter setting by ±2.5 millivolts to compensate for lead lengths, magnetic environment, any type or thickness of panel. This enables setting the meter accurately against a standard. Once calibrated, the meters maintain their tolerances for long periods. Meter accuracy is 2% full scale. Zero setting screw is on front of meter case.

Quality construction includes precision-polished jewel bearings, accurately machined pivots, fatigue-tested springs, and stress-relieved assembly. Spade-type meter pointer and easy-to-read numerals are designed for clearer, faster reading.

D.c. ammeters and voltmeters are available in all industrial ranges at $12.50 list, subject to trade discount.

Accurately-engineered high amperage d.c. meter shunts are individually calibrated, and accurately rated.





From baby spoons to trailer tanks, you can't miss – when you use a Stevens composition. Six standard compositions – plus special formulas for special jobs, too – assure you the right composition for whatever kind of job you're doing.

A Stevens composition will give you: Excellent cut and color • High flash point that minimizes fire danger • Excellent buff wear • Almost indefinite storing without settling • Ready sprayability within the normal 10-40 lb. pressure range • A job that cleans readily.

Write and tell us the specifics about your kind of finishing job. We will mail you a FREE 4-oz. sampling of the Stevens Liquid Stainless Steel Composition.

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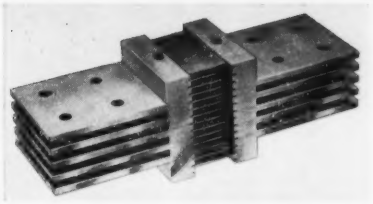
DETROIT 16, MICH.
BUFFALO CHICAGO DETROIT CLEVELAND DAYTON NEW HAVEN INDIANAPOLIS SPRINGFIELD (OHIO)



Quality construction of copper and manganese assures uniform current, properly controlled heat distribution, and infinitely long-life service. Large cross-section copper terminal blocks combine rigid mounting support with ample heat dissipation. Low temperature rise when properly installed in accordance with rated current.

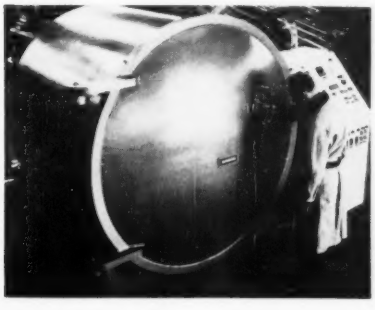
The shunts are available in standard types and sizes from 100 to 10,000 amperes, for 50 millivolt meters. Other size-ranges and special types are also available.

Vacuum Metalizer

F. J. Stokes Corp., Dept. MF, 5500 Tabor Road, Philadelphia 20, Pa.

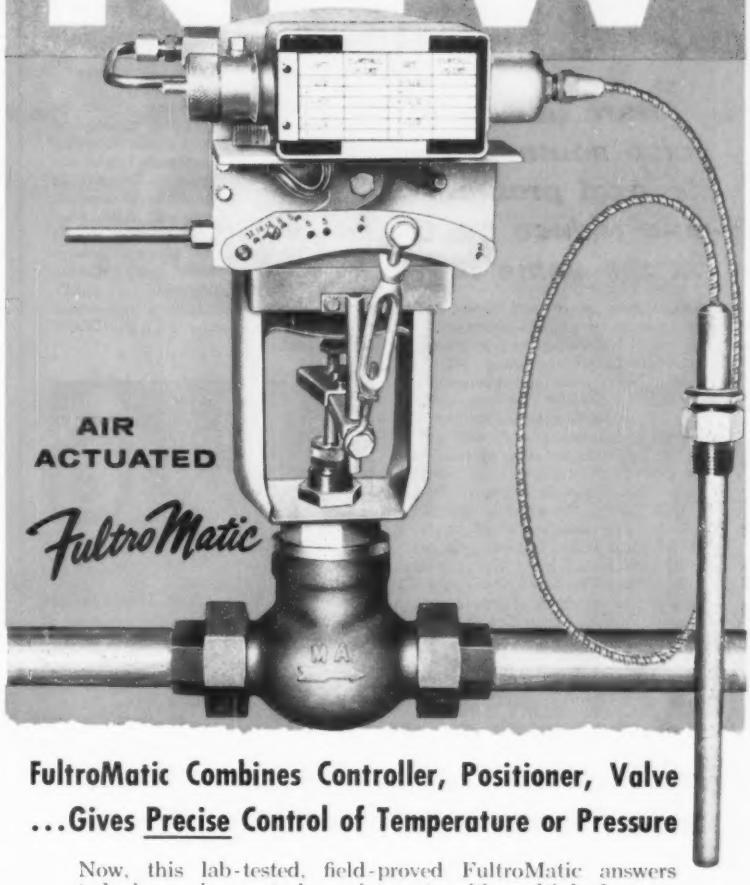
A new 72-inch vacuum coater with a completely redesigned pumping system gives faster pump-down to the metalizing pressure, and hence shorter coating cycles, plus greater flexibility in operation and easier maintenance, it is claimed.

The pumping system of the Model 427-4 comprises two identical "teams" of mechanical pump, diffusion pump and booster pump, each team connected independently to the vacuum chamber through its own high conductance manifold and high vacuum valve. Either of the diffusion-pump-plus-booster-pump pairs, and either of the two mechanical pumps can be cut out for periodic routine maintenance or can be isolated from the rest of the pumping system for selective performance checking, without shutting down the whole metalizer. The coater is normally operated with both pumping teams, but it can be operated successfully with a single team or with any



NEW

3-in-1 Controller at One-Half the Cost!



FultroMatic Combines Controller, Positioner, Valve ...Gives Precise Control of Temperature or Pressure

Now, this lab-tested, field-proved FultroMatic answers today's precise control requirements with multiple features never before available in one unit . . . *at about half the cost of two- and three-unit systems!*

- **Improved accuracy** with smaller, faster-responding element.
- **Positive valve positioning** by feedback action; no overshoot.
- **Adjustable proportional band** easily changed on the job.
- **Simplified settings** with knob, indicator, arbitrary scale.
- **Field reversibility:** control action quickly changeable.
- **Easy to install:** place valve in position, mount bulb, connect air.
- **Low maintenance:** rugged design for trouble-free service.

FOR COMPLETE FULTROMATIC SPECIFICATIONS, WRITE FOR BULLETIN LT-755

Robertshaw-Fulton CONTROLS COMPANY

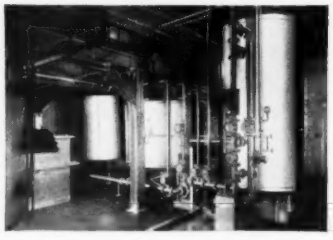
FULTON SYLPHON DIVISION • Knoxville 1, Tennessee

ionXchange

DO YOU WANT TO SAVE MONEY?

Here is how to solve some waste disposal problems - and reduce costs at the same time

IonXchangers of several types, and various units of allied equipment, as designed and manufactured by Illinois Water Treatment Company, offer a number of money-saving opportunities. *For example, consider the waste water from rinse tanks.* Contaminants can be removed and concentrated, and *pure* water returned to the rinse system. In some instances, chrome and other valuable metals can be recovered from the rinse water. *For another example, consider plating solutions* which, under many circumstances, become polluted and less efficient. The contaminating materials can be removed, recovered if valuable, and the bath maintained at high purity. Also, impurities found in water supplies, to spoil the appearance of plated or anodized parts, can be removed so that uniform quality of work is assured. Spent metal finishing solutions such as aluminum bright dip can be purified for re-use. Toxicity in otherwise-clean waste can be eliminated. All of these treatments will, in one way or another, contribute substantially to improved products, more efficient operations, and lowered costs. *Specific possibilities of applications of ionXchange in your plant can be determined by talking to your ILLCO-WAY representative.*

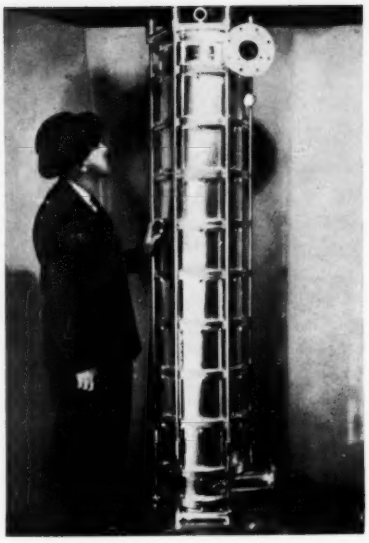


IonXchanger recovery unit for plating solutions

ILLINOIS WATER TREATMENT CO.
840 CEDAR ST.,
ROCKFORD, ILLINOIS

NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Can.

ILLCO-WAY



graphite gives a thermal conductivity of 87/BTU/hr/ft²/deg.F. The coefficient is almost equal to that of copper, aluminum, and red brass, and is considerably better than extruded graphite, cast iron, steel, lead, tantalum, stainless steel, etc., it is claimed.

Heat exchange takes place between two sets of passages, axial and radial, and the efficiency of this unit is greatly increased by the continuous turbulence caused by the mixing chambers between the blocks. This, coupled with the absence of cemented joints, provides an efficient, corrosion resistant, compact, strong heat exchanger.

The exchanger is recommended for such applications as the cooling and heating of anodizing solutions, plating solutions, pickling acids, etc.

combination of mechanical pumps and diffusion-plus-booster-pump pairs.

Total pumping capacity of the two 16-inch "Ring-Jet" diffusion pumps and the two 4-inch "Ring-Jet" booster pumps which back them up is 22,000 cfm. at 0.5 micron. The two gas-ballasted "Microvac" rotary mechanical roughing pumps each have a displacement of 300 cfm. The combination is easily capable of pumping down the clean dry chamber to the normal coating pressure in 5 minutes or less. For those who demand even greater mechanical pumping capacity for shorter roughing cycles, a third mechanical pump (of any capacity) can easily be added to the pumping system.

Electrically interlocked push-button control over pumps and valves guarantees fool-proof operation in the correct sequence. Automatic cross-over from rough pumping to fine pumping, and timer-controlled filament firing are provided as standard features. Fully-automatic operation, including filament firing and vacuum break, is available as an optional extra feature at additional cost.

Impervious Graphite Heat Exchanger

Carbone Corp., Dept. MF, Boonton, N. J.

A corrosive resistant graphite heat exchanger, the "Polybloc" is composed of easily interchangeable, impervious graphite blocks, molded to give high thermal conductivity. The molded

Chemical Floor Patch

Maintenance Engineering Co., Dept. MF, 16 W. Johnson St., Philadelphia 44, Pa.

"P-D-Q Floor" is a quick drying patching compound which combines the best elements of epoxy resin with other corrosion resistant ingredients to provide an extremely strong and long wearing surface that protects against all acids, alkalies, and oils, and may be used indoors or outdoors.

It bonds securely to concrete, brick, stone, wood, steel or even glass block and is ready for light traffic in 4 to 6 hours, and for heavy trucking after drying overnight. The patch may be given a permanent non-slip finish where wet floors or metal surfaces present a constant accident hazard. It is easy to

apply even for unskilled labor, requires no heat or preparatory bonding applications, and may be applied directly to any clean or dry surface. It is packaged in complete ready-to-mix units weighing approximately 50 lbs. — a quantity that will cover an area of 50 sq. ft with a ⅛" thick coating.

Primer for Rusted, Damp Metals

Industrial Maintenance Div., The Sherwin-Williams Co., Dept. MF, Cleveland 1, Ohio.

A new primer, specifically formulated for use over rusted and damp metal surfaces and trade-named Metalastic, is designed to serve as a first coat on metal surfaces. It penetrates rusted surfaces to create a tight bond with the underlying metal. It is so formulated that it works into crevices to insure overall protection for irregularly shaped and rough surfaces. Where dampness is present, the primer displaces moisture and provides an ideal surface for recoating.

The primer will remain flexible in temperatures ranging from 40° below zero F. to 240°F. It covers solid in one coat, affording the same protection for sharp edges as for flat surfaces. Coverage is 550 sq. ft./gal. at a dry film thickness of 2 mils, applied by brush, roller or spray. Despite its penetration and high hiding characteristics, the coating is much lighter in weight than conventional primers, thus making application both easier and faster.

Lightweight Swing Grinder

Ryman Engineering Co., Dept. MF, 523 Spring Ave., Ellwood City, Pa.

This newest grinder, Model 712, for contact roll grinding and slack-belt polishing is small and compact. It develops 5 hp in constant service on a 2½" wide by 72" long abrasive belt. 46" long x 23" wide x 14" high, it weighs only 150 pounds with the 5 hp motor. Good balance provides handling ease.

Construction is nearly all aluminum. The frame, abrasive belt guard, motor mounting pad, starter pad, and hanger bracket are one casting with areas arranged for strength and rigidity. A bracket may be bolted to the frame for post-mounting.

The abrasive belt operates over a motor-mounted drive roll, a belt tension roll, and a rubber-covered, serrated contact roll. Belts are quickly changed by moving a lever, once to release tension and once to apply tension. Abrasive belts track properly, even over an optional canvas contact roll. Rolls are dynamically balanced; solid hubs prevent imbalance from dust accumulation.

Low Range Tong Ammeter

Columbia Electric Mfg. Co., Dept. MF, 4519 Hamilton Ave., Cleveland 14, Ohio.

Type PB Tong Test Ammeter, primarily designed for measuring small amounts of direct current, in one-half ampere divisions, from 0 to 10 amperes, can be used to read both a.c. and d.c. up to 20 amperes.

Measurements are taken easily and quickly by clamping the tongs around the electrical conductor, without breaking the circuit or insulation. Jaws can accommodate conductors up to ½ inch diameter. Two ranges are provided on one dial, 10-0-10 amperes for d.c. only and 0-20 amperes for both a.c. and d.c. The 10-0-10 d.c. scale utilizes an "elec-

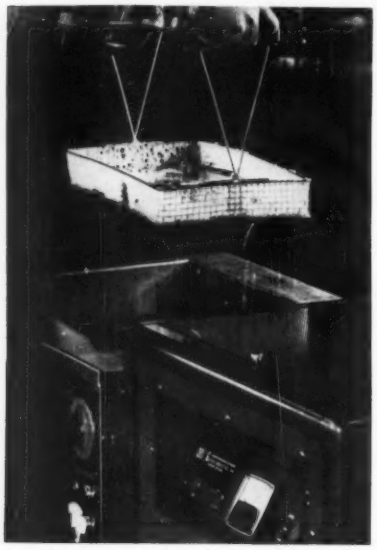
1.7 / 3.0 microns
THERM-X-RED†
IMMERSION HEATERS
Featuring
VAPO-VENT†
VAPOR and LIQUID TIGHT VENTING ASSEMBLY ON ALL QUARTZ HEATERS
and
NEO-TITE†
VAPOR and LIQUID TIGHT ASSEMBLY ON ALL METAL HEATERS
Presenting The NEW REPLACEABLE HEATING ELEMENT
THERM-X-RED, a superior line of immersion heaters, presented by N.J. THERMEX, introduces a new innovation of vapor venting to eliminate internal explosion in Quartz heaters. The VAPO-VENT assembly provides a venting system for expanding gases, a completely liquid sealed head assembly and an extremely versatile unit which permits field repair with standard replacement. These exclusive THERM-X-RED features are further aided by the NEO-TITE vapor and liquid tight assembly which protects the heating elements in both Quartz and Steel units. Here at last, is a thoroughly versatile unit permitting even accidental total immersion in highly corrosive chemicals with no harm to the equipment.
These and many more features are fully detailed in our latest catalog available on request. Models in standard, thermostatic and remote control thermostatic units are available in Steel, Stainless Steel and Quartz construction.
*ON QUARTZ HEATERS
† Trade Mark
N. J. THERMEX COMPANY, INC.
535 - 533 BERGEN ST., HARRISON, N. J.

trical zero" which is established by use of a magnetic source attached to the instrument.

Ultrasonic Cleaners

Gulton Industries, Inc., Dept. MF, 212 Durham Ave., Metuchen, N. J.

The new line of Glennite cleaners features modular design and new high temperature ceramic transducers, which are side mounted for consistent efficiency of operation. Consisting of 13 different cleaners in all, five separate tank sizes and six preset generators combine to offer industrial users distinct power categories for specific applications based upon the volume and number of pieces to be cleaned. The cleaning tanks are available in ½, 2½, 6, 16 and 25 gallon sizes. Generators are preset at 50, 100, 200, 500, 1,000 and 2,000 watts. The new high temperature ceramic transducers, used



for the first time in the new ultrasonic cleaner line, are capable of operating at 350°F., or 200 degrees higher than previous models.

WHATEVER FORM OR SIZE YOU NEED

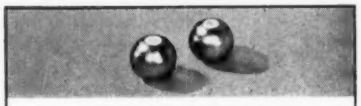
there are "Plus-4"® (Phosphorized Copper) Anodes to help you cut the costs of acid-copper electroplating—at the same price as ETP copper anodes

"Plus-4" Anodes in commercial use in practically all types of acid-copper electroplating have proved their advantages over wrought or cast electrolytic tough pitch copper anodes. The four advantages indicated by the name are:

+ 1 **No anode sludge (no "bagging" or diaphragms required).**
+ 2 **No copper build-up in the solution.**
+ 3 **Smooth, heavy cathode deposits.**
+ 4 **Up to 15% more cathode deposit.**

THE REASON for the elimination of sludge formation is that an anode of phosphorized copper develops an adherent dark brown film during electrolysis, which prevents the formation of free copper particles, but which in no way interferes with the plating operation or increases the electrical resistance of the bath. The phosphorized copper anode also corrodes more evenly, depositing more copper per pound on the cathode; gives a smooth, heavy deposit free from roughness due to lodgment of copper sludge particles, and leaves a small, compact "fish." There is no copper sludge or build-up of copper sulfate in the electrolyte.

WRITE FOR INFORMATION on how you can obtain a test quantity to supply one tank. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 59105



FORGED BALL ANODES

Anaconda ETP Copper Ball Anodes, used widely in cyanide plating, are cold forged from wrought metal. The result is a homogeneous, fine-grain structure, free from voids. Consequently they corrode very uniformly without disintegration. The balls are 2" diameter and weigh 1¼ pounds each. Identify them by the spearhead trademark.

ANACONDA®

"PLUS-4" ANODES Phosphorized Copper

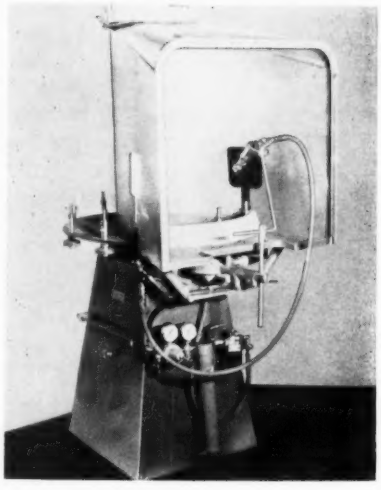
MADE BY THE AMERICAN BRASS COMPANY

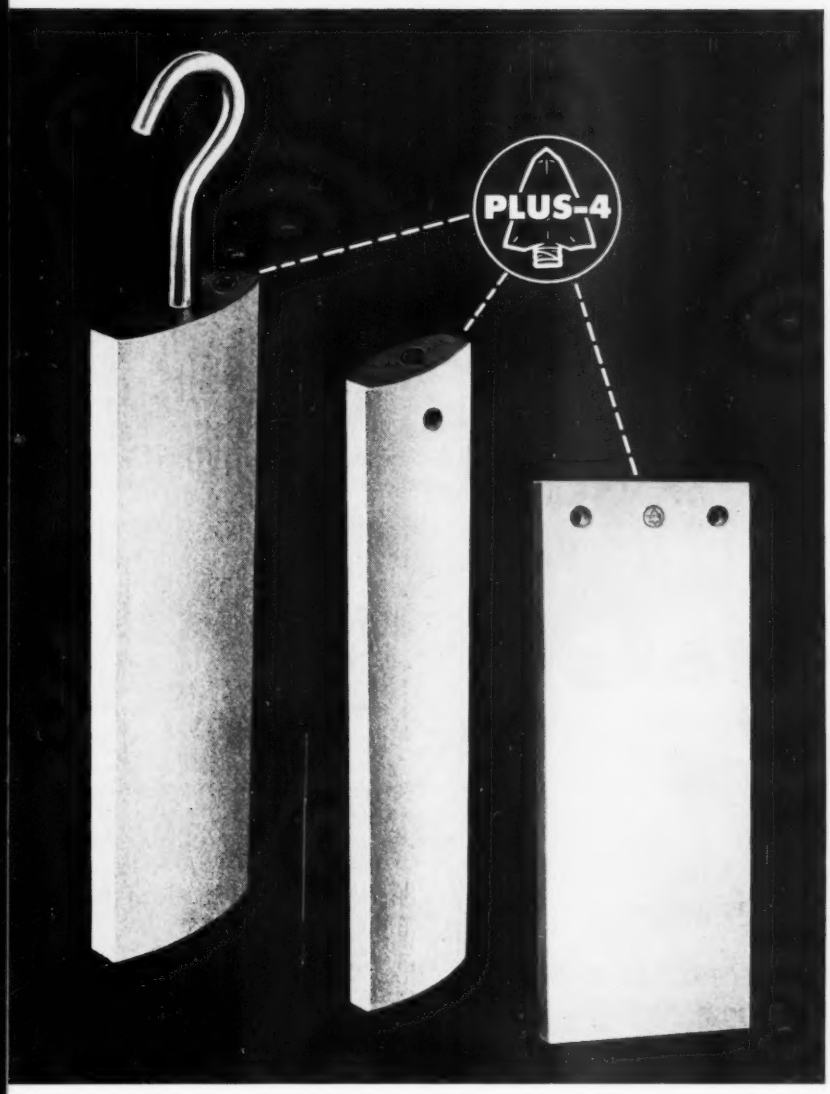
Spray Painting Machine

Dumatic Devices, Inc., Dept. MF, 22833 Dequindre, Hazel Park, Mich.

This is a rotary table type automatic spray painting machine which paints round parts at the rate of over 2400 pieces per hour. The spray-gun is mounted on a cam-controlled arm which also incorporates a spinning device to pick up the part and spin it in front of the gun, which sprays the part as it follows the part through an arc of its travel. The gun then indexes back and picks up the next part.

This machine also incorporates an interesting feature in that it has an automatic unloading device which is air operated, depositing the painted part





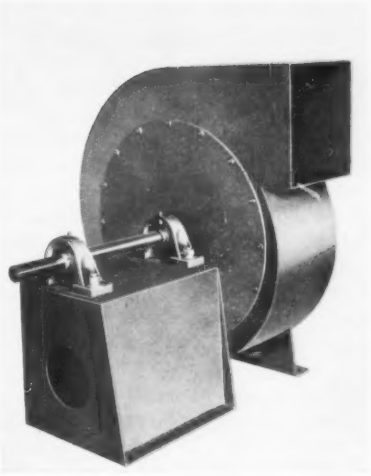
on a conveyor to go through the baking oven.

Industrial Fans

Garden City Fan Co., Dept. MF, 801 No. Eighth St., Niles, Mich.

A new radial blade series of centrifugal fans, designed for heavy duty industrial service in ventilating and material handling, can be applied at temperatures to 250°F. Gas tight and corrosion resistant construction can be furnished when required.

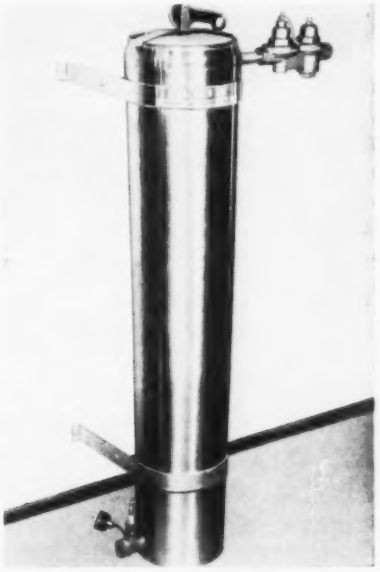
An outstanding feature of RF industrial fans is the new "Air-scoop" wheel, which is ruggedly constructed for heavy duty service at high pressures. Unique blade design permits this wheel to intercept air flowing into the fan with an angular, scoop action which minimizes shock loss. Standard wheel sizes range from 14" to 71¼" diameter.



Water Deionizer

Elgin Softener Corp., Dept. MF, Elgin, Ill.

A compact new deionizer is called the Junior 120 because it delivers up to 120 gallons of deionized water per hour. Included with the unit is a service whereby removable bags of mixed ion exchange resin, when exhausted, are simply lifted out and exchanged for factory regenerated refills. This eliminates the chore of regenerating, the expense of disposable resin cartridges



and the delays in waiting for replaceable units. This attractive stainless steel deionizer which measures only 45 inches in height hooks right into the water supply line.

The unit is ideally sized for those applications which do not justify a large deionizer, but are too great for portable or cartridge unit capacities. It delivers between 6300 and 8400 grains exchange or up to 1,500 gallons per cycle. When effluent resistance falls below 50,000 ohms, a built-in ohm meter actuates a pilot signal. Spent material is then replaced with fresh ion exchange resin which the user keeps on hand.

Gas Fired Immersion Tank Heater

Combustion Research Co., Dept. MF, Detroit, Mich.

Pyromerse is the trade name of this gas-fired immersion heater which

IF YOU CLEAN, PLATE OR PROCESS METAL

IF YOU PAINT OR STRIP PAINT

if you clean anything...

YOU CAN DEPEND ON THE

BEST PRODUCTS AND THE BEST TECHNICAL SERVICE

from DuBois Chemicals

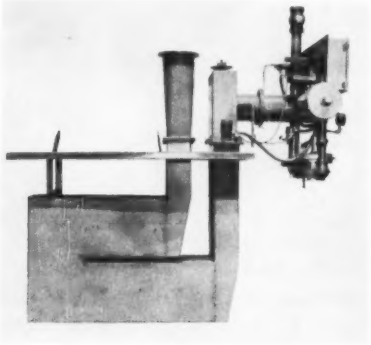
LEADERS IN SPECIALIZED PROCESSING AND MAINTENANCE CLEANING COMPOUNDS FOR THE FINISHING FIELD

THE DuBOIS CO., INC., CINCINNATI 3, OHIO

PLANTS AT: CINCINNATI · LOS ANGELES · DALLAS · E. RUTHERFORD, N. J.

CALL THE DuBOIS MAN NEAR YOU LISTED IN THE YELLOW PAGES UNDER "CLEANING COMPOUNDS"

utilizes a new design principle to yield greater heat transfer efficiency and, in so doing, consumes less fuel and checks in at about half the weight and tank displacement of tubular-construction units. It is easily removable from the tank without either loss of production or draining of the tank, and also portable so it can be easily transferred to a stripper tank when cleaning is necessary.



Efficiency, which is 75 to 80 per cent in water base liquids, derives from the fact that the heat exchanger section is a thin hollow rectangular duct instead of the usual tube. Hot combustion gases are drawn through the heat exchange duct by exhaust fans, thus causing energy producing pressure drop to happen in the exchange portion of the unit.

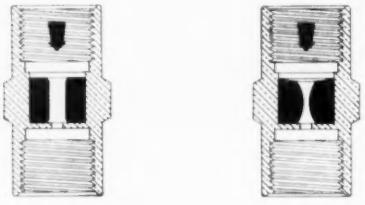
Units operate on either natural, LP, or manufactured gas, and are available in standard sizes up to 4 million Btu's per hour capacity. Larger sizes can be created where required. All heaters are available with automatic temperature controls, electric pilot ignition, safety equipment and are fully automatic in operation. Program timers are an optional feature.

Units can be fabricated from a variety of metals to accomodate most any liquid, regardless of its corrosive characteristics.

Flow Regulators

Taco Heaters Inc., Dept. MF, 1160 Cranston St., Cranston 9, R. I.

A new line of flow regulators in eight sizes from 2 gpm through 8 gpm has brass bodies, tapped ½" for sizes through 4 gpm and ¾" for the larger sizes.



Flow Control Under Minimum Inlet Pressure

Flow Control Under High Inlet Pressure

Control is obtained by the change in size and shape of the orifice, in the specially compounded and sized rubber member, as indicated.

The orifice is self-cleaning by the continual flexing of the rubber member.

They are accurate to a maximum of 10% plus or minus of the rated size when used within the range of 20 to 125 psi and suitable for temperatures to 160F.

Protective Coatings

Horsey-Robson & Co., Inc., Dept. MF, 551 Fifth Ave., New York 17, N. Y.

Two new products are a non-skid waterproof decking which combines great resistance to abrasion, moisture, oils, greases, acids, alkalies and salts, and a tank lining which is virtually fumeless, odorless and has extreme resistance to penetration from boiling water, steam, gasoline and oil, and grease. Both Horsey-Set products are non-toxic and are easily applied with a single coat.

Both are non-aqueous, solvent-free and of a permanent coloring. They are claimed to have a wide color range and are water and weatherproof with permanent adhesion. Both products are safe and easy to handle and work on

wood, concrete, steel and non-ferrous metals and asphalt. They are highly resistant to cracking or chipping, have elongation, minimum shrinkage when drying or curing, form a monolithic film with no cells or cracks, are fire resistant and have far greater adhesion to most concrete, masonry and wood products than these materials have internal strength. Their properties have enabled them to solve previously difficult protective coating problems.

High Vacuum Pumps

Consolidated Electrodynamics Corp., Rochester Div., Dept. MF, 1775 Mt. Read Blvd., Rochester 3, N. Y.

The PMC line of oil diffusion high-vacuum pumps provides peak speeds up to 138% higher than speeds attainable with conventional pumps of comparable size, it is claimed. The 4" model pumps at a maximum speed of 720 liters per second over the low pressure range from 2×10^{-5} to 2×10^{-3} mm Hg, with a limiting forepressure of 0.5 to 0.6 mm Hg.

A new immersion heater speeds vaporization by direct, internal heating of pumping fluid, while an extension of the heater assembly provides an additional "boost" in the vapor phase. New jet design enhances vapor flow and expansion for optimum diffusion.

The jet assembly of mated parts, machined of cast aluminum, is more sturdy than the spun aluminum type and cannot be damaged as easily. Disassembly is a matter of seconds, with all jet and heater parts easily accessible for cleaning.

Two models of the new line are now available. Both the 4" and 6" model have a range of 7×10^{-7} to 1×10^{-2} mm Hg.

The Leading Name in Immersion Heating

All 3 Types

- INSTANT HEATING
- SHORT-PROOF
- AVAILABLE IN ALL VOLTAGES—WATTAGES, one and three phase
- STOCKED FOR IMMEDIATE SHIPMENT

TYPE "U"
PATENT PENDING
World's first successful U-tube
ACID Heater
—Guaranteed to outperform and outlast all other quartz heaters.

TYPE "GN"
Pat. No. 2,740,886
Standard straight tube Quartz
ACID Heater
—Vapor-proof junction box; replaceable heating element.

TYPE "MB"
"Multi-Blade", Metal-sheathed
ALKALI Heater
—Portable, burn-out proof, easy mounting, long life.

WRITE FOR BULLETIN

If you're looking for
ACCURACY—EFFICIENCY—LONG LIFE—and ECONOMY
...you'll get it with Glo-QUARTZ!
Available from your Electroplating Distributor!

Glo-QUARTZ ELECTRIC HEATER CO., INC.
*Trademark Reg. U.S. Pat. Off. WILLOUGHBY, OHIO Phone: Willoughby 2-5521

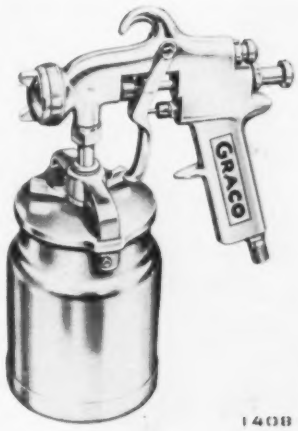
Cup-Type Spray Gun

Gray Co., Inc., Dept. MF, 1032 Sibley St., N.E., Minneapolis 13, Minn.

This lightweight, exceptionally well-balanced Graco spray gun features a two piece, aluminum alloy body with a built-in air distributor for more even air distribution and better pattern. The gun has been engineered so no gaskets are required in tip or cap assembly, eliminating chance for leaking and simplifying cleaning.

All fluid tips, as well as all male threads, are stainless steel to reduce wear and give longest possible useful life.

The durable, one piece, drawn alum-



1408

inum paint cup has a fast-acting spider lock and cover supported yoke clamp that securely holds cup without straining lock pins.

Barrel Finishing Compound

Esbec Barrel Finishing Corp., Dept. MF, 190 Henry St., Stamford, Conn.

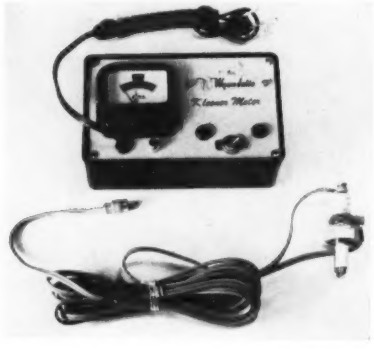
No. 134, a new type of neutral, non-abrasive compound used for a large variety of barrel finishing operations, in many cases, replaces acid compounds and eliminates the necessity for subsequent neutralizing. Used with chips or steel media, it is ideal for cleaning, light descaling, bleaching or fast burnishing operations. It is claimed to be highly effective for removing rust or other oxides from steel or alloys, and for bleaching, cleaning or burnishing steel, copper, brass, beryllium copper, and many stainless steels. This compound leaves no soap film after rinsing.

Test Meter for Cleaners

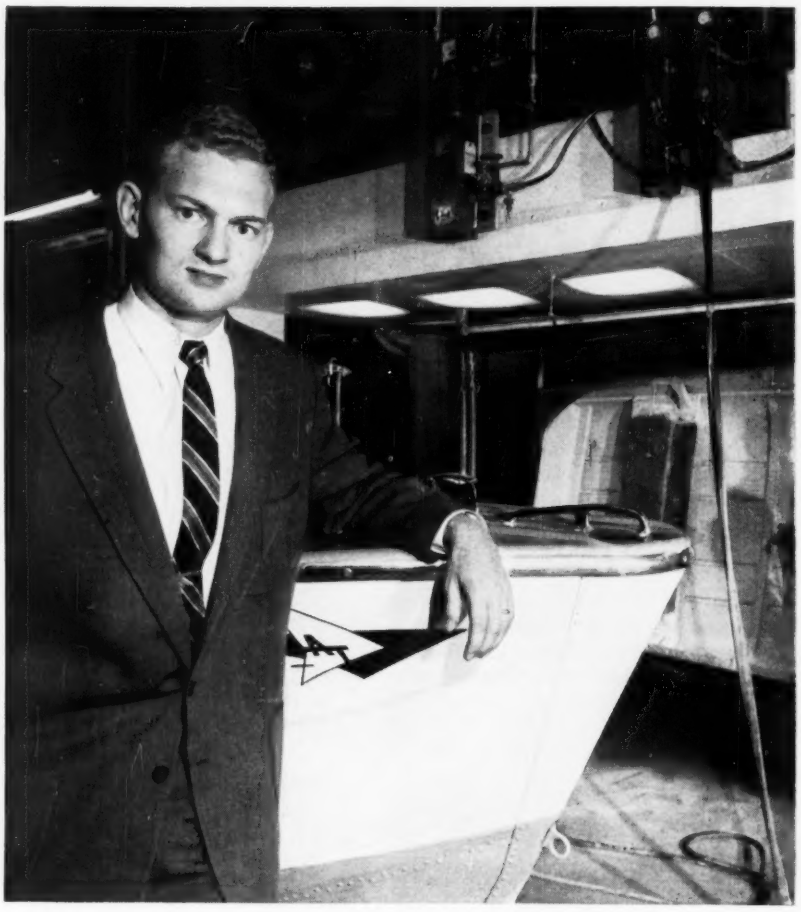
J. B. Ford Div., Wyandotte Chemicals Corp., Dept. MF, Wyandotte, Mich.

The Kleener meter, a new concentration control meter for chemical compounds in spray washers, paint booths, phosphate installations and soak tanks, is a heavy-duty, electrically operated instrument for industrial plants. It includes a stainless steel probe for installation through the tank wall and into the solution, electrical leads, and complete instructions for easy installation. Needle on easy-to-read dial indicates solution strength at all times. The meter provides a continuous and easy method of maintaining consistent solution strength throughout day's operations. It eliminates the need for titrating solutions with each make-up and periodic checking of solution strength.

Size of the meter, which operates on 115 volt, 50-60 cycle, a.c., is 3¾" x 2" x 6¼". An attractive yellow, vinyl-plastisol-coated, metal chassis is mounted within a phenolic plastic case. Probe is of stainless steel and porcelain.



"We took the guesswork out



Chief Engineer Venner shown with modern, well-lighted DeVilbiss water-wash Spray Booth in background. Note paint heater affixed to top of booth.

Protective Hand Creams

Mine Safety Appliances Co., Dept. MF, 201 No. Braddock Ave., Pittsburgh 8, Pa.

Three new creams are claimed to provide protection against virtually any skin irritant commonly encountered in industry. The new creams, called Fend, are now available in three special-purpose formulas. A-2 has a vanishing cream base, reinforced with a combination of salts that ward off water-insoluble irritants, such as tar and grease. I-2 has a non-vanishing cream base with petrolatum for maximum protection against water-soluble irritants. S-2 is a silicone-reinforced vanishing cream which provides a barrier against diverse soluble and insoluble irritants. It is especially adaptable for long-lasting protection.

All three cream formulas contain hexachlorophene for bacteriological and anti-fungus effects, as well as an exclusive deodorant. They can be removed easily in mild soap and water. An emollient feature prevents drying, cracking, or chipping.

Solvent-Emulsion Cleaner

Tect, Inc., Dept. MF, Northvale, N. J.

Teclene is a golden yellow liquid of the viscosity of light mineral oil which

# of quality control—thanks to DeVilbiss Paint Heaters"

"The function of paint heaters is critical in our operation," states Allen Venner, Chief Engineer, Southwest Manufacturing Co., Little Rock, Ark., makers of the famed Arkansas Traveler aluminum pleasure boats.

"Most of our craft are produced during the cool, rainy winter months. Indoor temperature and humidity are so variable that continually adjusting pressures and paint viscosity was a time-consuming 'guessing' game.

"Now, with DeVilbiss Paint Heaters, we have complete control over the quality of our boat finishes. Paint leaves the gun at approximately 140° F., regardless of room temperatures; the finish lays on evenly with a fine film build and superior gloss.

Painting costs reduced 30%

"This complete DeVilbiss installation brought us substantial cost reductions: By spraying at lower pressures, air compressor power costs went down 20%. We cut thinner and paint consumption 20%. There was a 50% reduction in booth maintenance. Overall savings amounted to 30%."

Call your DeVilbiss representative today and get the facts, first-hand, on the industry's most complete and up-to-date line of spray painting equipment.

THE DEVILBISS COMPANY
TOLEDO 1, OHIO
Barrie, Ontario • London, England
São Paulo, Brazil
Branch Offices in Principal Cities

FOR BETTER SERVICE, BUY
DEVILBISS

forms clear solutions with all chlorinated solvents, most safety solvents, and with water as well. It is translucent when combined with aromatic solvents. It may be used straight in many cleaning operations to blend completely with oil and grease and may then be flushed off with water. It may also be added to a great variety of other solvents to make them water rinsable.

In a reverse manner, it may be used straight or with modest amounts of water to permit rinsing with a chlorinated solvent or with safety solvents.

The product has no flash point, may be brushed or sprayed on a surface and allowed to stand for several minutes. It may then be hosed off easily with cold or warm water, instantly forming an emulsion which carries with it both solvent-soluble and water-soluble soil. Although alkaline, the material may be used in the cleaning of all metals and will not attack aluminum.

Indicator and Indicating Controller

Norcross Corp., Dept. MF, Newton 58, Mass.

A new indicator and indicating controller provide viscosity control at a lower cost for applications where a permanent record is not required.

These new models are for use with the company's basic measuring elements, which operate on the principle of measuring the time required for a piston to fall a given distance through the solution to be measured. The indicator and indicating controller can be located any reasonable distance from the measuring element and can be furnished with high and low viscosity alarms.

Protective Coating

Heatbath Corp., Dept. MF, Springfield 1, Mass.

A new liquid product, known as Duralak, contains complex corrosion inhibiting materials and water soluble polymers. Solutions made by adding 2 volumes of water to 1 volume of the product are used to apply clear, thin hard protective coatings on all metals and conversion coatings, wet or dry, to increase corrosion and abrasion resistance, and as a bond for painting.

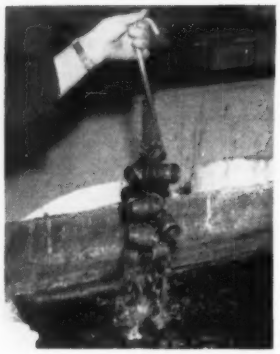
No specialized equipment or methods are required for its application and no toxic fumes or fire hazards are encountered. Solutions can be applied by immersion, brush or spray.

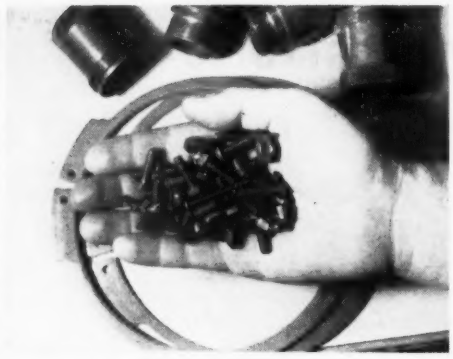
Tantalum Bayonet Heaters

Pfaudler Co., Dept. MF, 1089 West Ave., Rochester 3, N. Y.

New tantalum bayonet heaters have a rate of heat transfer seven to eight times greater than that obtained with

conventional bayonet heaters. In addition to its superior heat transfer rate, tantalum's high ductility assures excellent resistance to physical and thermal shock. Because tantalum can be used in most acidic environments, except hydrofluoric, without perceptible corrosion, extremely thin wall sections can be used—with consequent improvement in heat transfer rate. The units





KENVERT® NO. 11

best olive drab for zinc and cadmium

The General Electric Plant, Industrial Park, Syracuse, uses KENVERT No. 11 because a continuous olive drab film is obtained free of bruise marks on bulk work and connectors. This film absorbs the KENVERT No. 11-B to give a uniform black finish after dyeing.

By switching over to KENVERT No. 11 GE not only improved quality, but also enjoyed a cost reduction and these advantages:

KENVERT No. 11 ADVANTAGES

- Long Life
- Constant color
- Only one product required
- Stable non-varying solution as used
- Excellent corrosion protection
- Easy to dye
- Easy to control
- Available in non-returnable drums
- Meets requirements of government specifications on zinc and cadmium

Specify KENVERT No. 18-M

for economical, iridescent films *also with hard wet film strength* for bulk treating on zinc and cadmium.

WRITE for information and data on "compatible" brighteners for zinc and cadmium for chromate treatments.

CONVERSION CHEMICAL CORPORATION

100 East Main Street, Rockville, Conn., Phone: TRemont 5-3357
Licensee: Nicromatic Ltd., Toronto, Canada
Distributors in major industrial United States cities.

have 0.013″ wall cross section. All seams are butt-welded using the inert gas arc method to eliminate weld contamination. Vacuum arc melted material is used to eliminate weld porosity.

One and a half inch diameter bayonets are being stocked in 1, 2, 3, 4, and 5 tube bundle combinations. Standard lengths will be 12″ to 72″, and 100, 150, and 200 psi internal, will be accommodated depending on model. Using a three tube heater, heat transfer surface will vary from 1.24 square feet for the 12″ length to 7.13 square feet for the 72″ model. Custom 2″ diameter bayonet heaters will be available in clusters of 1 to 5 and lengths from 12″ to 84″.

Chemical Solution Feed Pump

Fischer & Porter Co., Dept. MF, 28 Jacksonville Road, Hatboro, Pa.

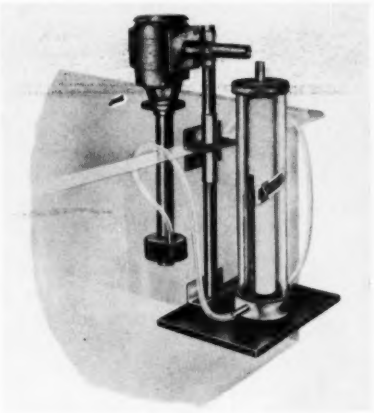
A new chemical solution feed pump features a hydraulically balanced Teflon slack diaphragm. The diaphragm is not connected to the plunger and is unconditionally guaranteed for the life of the pump. The rate of the pump, which operates at 70 strokes per minute approaching continuous flow, can be manually adjusted during operation or while shutdown. The new pump has a capacity up to 65 gallons every 24 hours, an operating pressure up to 125 psi, and a maximum continuous temperature rating of 100F.

Sump Filter Pump

Sethco Mfg. Co., Dept. MF, 2284 Babylon Turnpike, Merrick, N. Y.

A completely new sump filter unit with detachable filter chamber provides simplicity and economy of operation by offering flexible filtration and agitation for every type of solution up to temperatures of 250°F. Both pump and filter chamber are easily attached to or detached from the flange top of the tank by means of special supporting bracket assemblies.

All the advantages common to both centrifugal and self priming pumps are retained in this compact unit while their disadvantages are eliminated. The epoxy column, impeller and self priming pump are resistant to corrosive chemicals and heat. The shaft can be had in stainless steel 316, Hastelloy C, or titanium. Thorough depth filtration down to 1 micron in size is provided by a full view Lucite filter chamber or high temperature epoxy chamber equipped with filter tubes of cotton, Dynel, porous stone, or porous carbon. A ½″ h.p. motor is totally enclosed and is equipped with ball bearings. A stainless steel pinch valve is provided for flow regulation.



At present two sizes of sump pumps are available, the ⅜″ and ½″ sizes, which will deliver 900 and 1500 gallons per hour, respectively. Both pumps will develop a pressure of 25 p.s.i. before shut off. Larger pumps, ¾″ and 1″ are contemplated in the near future.

Abrasive Blast Unit

Wheelabrator Corp., Dept. MF, 1150 South Byrkit St., Mishawaka, Ind.

Spinner Hanger cabinets are designed to meet the cleaning need of users whose production rates outstrip the capacity of standard blast equip-

ment but are not sufficiently large to warrant installation of high production equipment such as monorail blast cabinets.

Although each machine is designed for a specific cleaning application, their essential features are compartmented work areas, spinner devices for rotating the work while it is blasted, airless blast units, and work-carrying fixtures.

Compared to a high production monorail installation, a spinner hanger cabinet requires less floor space but will still accomplish similar uniform cleaning on castings with deep pockets, cavities and recessed holes.

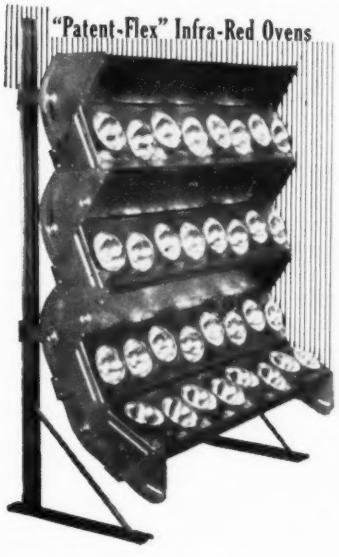
Indexing arrangements turn the compartments so that one is always exposed to the operator for loading and unloading. Blasting can be achieved in one or several stages, depending on requirements, and is continuous in operation.

The machine can be built to fit individual requirements as to size, number of compartments and wheel arrangements. The size of the machine can be varied so as to handle virtually any size part.

Infra-Red Oven

Patent-Flex Mfg. Co., Dept. MF, Cloverport, Ky.

A new type of infra-red oven permits higher ambient air temperatures within the oven for greater efficiency. To accomplish this the radiation from each lamp row is projected upwardly at approximately a 30° angle, which gives better heating of the lower part of the materials being processed, where normally there is reduced heating due to the cooler air contacting the underside of the work.



Lamp sockets operate cooler, as the socket absorbs less heat from the lamp, and permits 375 and 500 W. R-40 lamps, with hermetically sealed reflectors to be used. With this arrangement ventilation can be held to the minimum requirements necessary to meet safe operating conditions.

The higher ambient temperatures, in combination with the hermetically sealed reflector lamp, makes this oven ideally suited to heat-degreasing and other baking applications, where smoking-vapors would quickly cause loss of efficiency if open type metal reflectors were used. Oven shut down time for cleaning maintenance is substantially eliminated, even under excessively smoky operating conditions, it only being necessary to wipe off the face of the lamp to keep the efficiency at top level. Removal of lamps or heating elements, in order to clean metal reflectors, is eliminated.

Stainless Steel Filter

Commercial Filters Corp., Dept. MF, 2 Main St., Melrose, Mass.

The new SS7.5C Fulflo filter, made with a durable one-piece shell of Type 316L stainless steel, is designed for operating pressures up to 750 psig. It employs a 10 inch honeycomb filter tube, manufactured in a wide range of precision densities to provide any degree of continuous micro-clarity, down to 1 micron. Tubes are available in cotton, Nylon, Orlon, Dynel, acetate or

NEW!

defies chemical attack and heat

Sethco all plastic High Temp. Epoxy Sump Filter Pump

with detachable FILTER CHAMBER

self-priming pump is in the tank

no loss of liquid

Get flexible filtration and agitation by . . . (1) Rotating your sump pump while having a filter chamber of the correct size attached to each plating tank. (2) Rotating your filter chamber using an individual sump pump in each tank. (3) Using one sump filter pump for ALL your plating tanks. (4) Using a separate sump filter pump for each tank where continuous filtration is necessary.

Compact, takes little space in tank.

Model UAL-20 200-300 Gals./Hr. other models from 50-1200 Gals./Hr.

1. Epoxy pump body and extension assembly with epoxy impeller with Stainless Steel 316, Hastalloy C or Titanium shaft. Epoxy column 10⅛" long.
2. ½ HP Motor, totally enclosed, ball-bearing.
3. Full view high temp. Lucite filter chamber (available in Epoxy) with cotton, dynel, porous stone or porous carbon filter tubes.
4. Unfiltered liquid from pump.
5. Perforated inlet dispersion tube.
6. Filtered liquid return.
7,8 Adjustable sump pump and filter chamber bracket assemblies.
9. Pump and Filter Chamber both supported from flange top of tank.

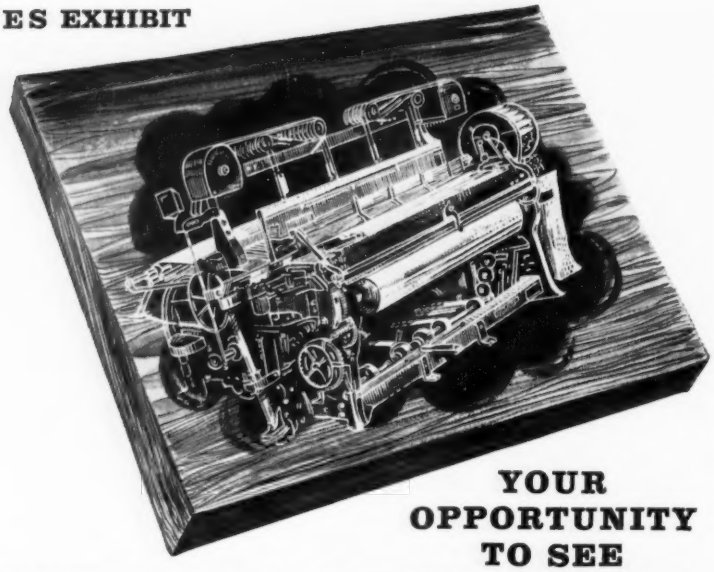
"See it in action" BOOTH 65C

WRITE for Illustrated Folder

Sethco MANUFACTURING CORP

2286 Babylon Tpke., Merrick, L. I., N. Y.

AES EXHIBIT



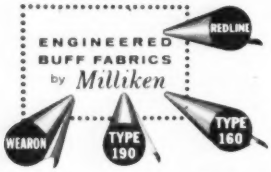
YOUR OPPORTUNITY TO SEE

HOW BUFF CLOTH IS MADE

The weaving of a cloth from which polishing and buffing wheels are to be made is fully as important as the selection of fiber for spinning, the spinning operation itself and the special treatment of the cloth to impart the better wear resistance.

We can't show you all of these steps at our booth in the AES convention but we can show you the weaving operation. At intervals we will operate a standard loom with expert cloth-making specialists on hand to answer questions.

So much for our exhibit. Another current project you will be very much interested in is a new brochure, describing in detail the care with which all steps in the making of Deering-Milliken cloth are taken and the controls used to assure top quality products. If you will write to us, we'll be glad to send you a copy of this brochure.



At present we are marketing four different buff cloths —Wearon®, Type 190, Redline and Type 160. Each of these has distinctive operating qualities. We suggest you have trial buffs made up of all four—and be sure to ask for the cloth in the trade mark pattern—so that you can find the cloth best for your needs and then compare its cost/performance ratio with that of the cloth you are now using.

DEERING, MILLIKEN & CO., INC.
1045 SIXTH AVENUE • NEW YORK 18, N.Y.

glass fibers. Cores are of plain steel, #316 stainless steel, tinned steel, copper, tinned copper, nickel, PVC, or phenolic-impregnated paper.

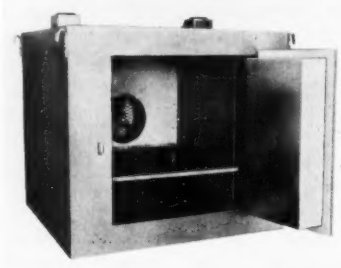
Maximum air flow rate is 650 scfm at 750 psig operating pressure with initial pressure loss of 3 psi. Flow rates for liquids varies according to nature of fluid and operating conditions, with maximum of 5 gpm for liquids of aqueous viscosity. Straight line pipe connections (dry seal thread) have standard ¾" NPTF.

Electric Oven

Trent, Inc., Dept. MF, 211 *Leverington Ave., Philadelphia* 27, *Penna.*

A new basic oven, for controlled heating processes up to 650°F., with all extras optional, is designed to meet the demand for "custom-made" heating without the expense of extra equipment which may be unproductive for the small shop.

The basic oven, designated "COF", has "Folded-and-Formed" heating elements, 3" glass wool insulation, steel



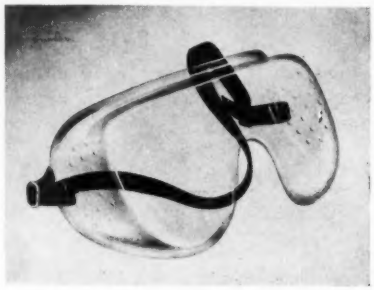
castings, direct drive fan, a single hinged door with explosion release latch, and one shelf. It is available in four sizes and three voltages, with or without forced air circulation. Optional equipment available includes legs, double doors, additional shelves, door switch, adjustable blast gates, and three separate types of control.

Another oven, the "COFH," provides the same basic design and options for processes requiring temperatures up to 1200°F.

Eye Shield

Kerrco Products, Dept. MF, Box 228, Lincoln 7, Nebr.

The E-Z-Fit shield is of all plastic molded construction to comfortably fit the contour of the face and has been designed to be worn with or without prescription glasses. It is held on by an adjustable elastic band with ventilat-



ing holes on the side of the shield to give greater wearing ease and positive protection with all angle viewing.

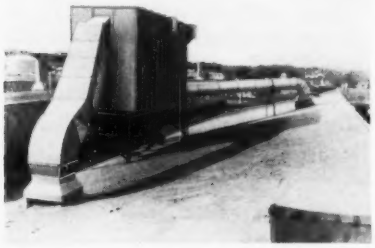
Each shield is individually boxed with an attractive display stand included with each dozen. The price is $1.50 on the crystal clear and $1.75 on the green tint for greater eye ease. Distributed through jobber and dealers.

Dust Collector

Aget Mfg. Co., Dept. MF, Adrian, Mich.

Developed for industrial operations where the volume of air to be handled is unusually high, and used in conjunction with standard vented Dustkops, Filterkop receives all the air collected by these units, recovers nearly 100% of the dust load, dissipates harmful fumes, and recirculates air that has been thoroughly cleaned.

The basic unit consists of heavy gauge steel housing, a hopper, 80 cloth filter tubes, and a shaker mechanism. Accumulated dust is automatically shaken from the tubes into the hopper at the end of each fan operation. Depending on plant requirements, the unit



may consist of a single unit or any multiple thereof. One shaker serves two units and, no matter how large the installation, only one air inlet and one air outlet are needed. Easy access for tube installation and inspection are provided by a large door.

Manufacturers' Literature

Automatic Processing Conveyor

Crown Rheostat and Supply Co., Dept. MF, 1965 Pratt Blvd., Elk Grove Village, Ill.

The above firm has issued a four page, illustrated brochure on its "M-P" multi purpose automatic processing conveyor. Advantages are given for multi cycle processing in plating, anodizing, painting, phosphating, and rubber dipping operations.

Room-Temperature Cleaner

Oakite Products, Inc., Dept. MF, 118 Rector St., New York 6, N. Y.

Savings made possible by the cleaning of metals with Oakite Room-Temp cleaner are described in a folder recently published. The booklet points out advantages of the material and its versatility in application.

Aluminum Coating Process

Parker Rust Proof Co., Dept. MF, 2177 E. Milwaukee, Detroit 11, Mich.

A four page illustrated booklet gives information on the Bonderite process for aluminum on unfinished or painted products. Advantages are given, and its adaptability to different uses pointed out.

Finishing Aluminum

Frederick Gumm Chemical Co., Inc., Dept. MF, 538 Forest St., Kearny, N. J.

In the latest edition of the Clepo Aluminum Finishing Manual the reader will find a detailed discussion of many different problems, as well as methods and materials for taking care of these problems. Such operations as cleaning, deburring, etching, deoxidizing, descaling, preparation for welding and anodizing are covered; also treatment of corroded stock.

Metal Cleaning-Heat Processing Equipment

Baron Industries, Dept. MF, 241 West Avenue 26, Los Angeles 31, Calif.

Contents of a new, fully illustrated facilities and equipment catalog, #10M359, include photos, drawings and complete specifications of the firm's diversified line of standard degreasers and ovens that are fully assembled for rapid shipment and installation. In addition, there is included photographic examples of special metal cleaning and heat processing units individually created to meet specific industrial requirements.

Rust Preventives

Rust-Lick, Inc., Dept. MF, 755 Boylston St., Boston 16, Mass.

This 20-page booklet presents basic information on rust, its causes, and application of preventives. Included are factual data on the various types of rust preventing liquids, their recommended applications, and a graphic reproduction of their rust preventing qualities.

Hammond
AUTOMATICS
cut
GRINDING · POLISHING ·
BUFFING · DEBURRING ·
costs

Your finishing problems can be solved by the proper application of Hammond Automatic or Semi-Automatic equipment. Standard heads, turrets and conveyors are used wherever possible to keep costs down. Special machines are designed for the unusual job.

SEND SAMPLES FOR COMPLETE ENGINEERING REPORT

Hammond OF KALAMAZOO "Good Machinery" Since '82

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SEE US AT THE INDUSTRIAL FINISHING EXPOSITION —
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GOLD PLATING
SOLUTIONS

. . . LEADER in

Electrolytic
Precious
Metals!

ONE OPERATION
Antique Gold Solution
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ONE OPERATION
French Grey Solution

A Rich French Grey that Improves Quality and Costs Less!

OTHER DAVIS-K PRODUCTS:

- HARD GOLD SOLUTION for Printed Circuits and Electronic Parts
- POTASSIUM GOLD CYANIDE SALTS
- LUSTROUS WHITE RHODIUM SOLUTION
- Variable-type Tank Rheostats, specially designed for precious metal plating.

ALL DAVIS-K GOLD PLATING SOLUTIONS ARE:

- Made in all colors
- Color constant
- Tarnish-resistant
- Brilliant in finish
- Bottled by Troy Weight
- Made from assayed US Treasury Gold only
- Ready for immedaite use

We are fully equipped to reclaim old gold and rhodium solutions.
No charge for small sample plating.
Write Dept. MF for details.

FREE
Consultive Service
Call on Davis-K process engineers for help with your special plating problems and installations.

"Where Glittering Elegance Reflects Lasting Quality."

100% PURE GOLD DKP SOLUTIONS

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PRODUCTS, CO.
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LOngacre 4-1978-9

Ventilation & Heat Transfer Equipment

American Air Filter Co., Inc., Dept. MF, 215 Central Ave., Louisville 8, Ky.

Bulletin No. 518, describes a complete line of air filtration, process dust control, air conditioning, heating, ventilating, heating specialties and controls for industry.

Conversion Tables

John Swift Chemical Co., Inc., Dept. MF, Canton, Conn.

The above firm has issued a three page technical bulletin, No. CT-1 P1, which covers conversion tables for amperes, British thermal units, cubic centimeters, horse-power, kilowatts, milligrams, pounds/cubic foot, watts, etc.

Organic Finishing

International Rustproof Corp., Dept. MF, 1061 East 260th St., Cleveland 32, Ohio.

An advanced system for producing corrosion resistant, organic film finishes on fasteners and small parts is reported and described in a new technical bulletin. Entitled, "A Two-Phase System For Producing Corrosion Resistant Coatings Using Bulk Handling Methods," the report also traces development of fasteners and fastener finishing methods.

The report also gives specifications for the system's preliminary phosphate coating treatment, and describes equipment, procedures and controls for applying the organic finishing film and inhibitor by dip-spin bulk handling methods.

Dust & Fume Control Systems

Kirk & Blum Mfg. Co., Dept. MF, Cincinnati 9, Ohio.

Sixty different plant installations, from a wide variety of major industries, are illustrated and described in a new three-color, 52-page catalog. Twelve pages are devoted to systems for the metalworking industry to show how installations are specifically created for buffing, grinding, plating and heat treating. Wet, dry, electrical and centrifugal collection are all shown.

Abrasive Products

The Carborundum Co., Dept. MF, Niagara Falls, N. Y.

A handy colored wall chart lists specifications in quick reference form on:

(1) Die Barbering Wheels;
(2) Sticks, Stones and Rubs; and
(3) Finishing Compounds.

Pictures of products supplement the mathematical data.

Ultrasonics

Acoustica Associates, Inc., Dept. MF, 26 Windsor Ave., Mineola, N. Y.

A reprint of a 5-page illustrated article about ultrasonics and its uses, presents a complete round-up of this interesting subject.

Abrasive Blasting

Hydra-Blast Mfg. Div., Automation Services, Inc., Dept. MF, P.O. Box 5554, Fenkell Station, Detroit 38, Mich.

A four page, illustrated brochure is available on the above firm's custom-designed and engineered blasting equipment and cabinets; also specially compounded abrasives, supplies and accessories.

Metal Cleaning Guide

Magnus Chem. Co., Dept. MF, South Ave., Garwood, N. J.

A series of charts in handy file-folder form is available to simplify the task of selecting the correct cleaning method and chemical for the various metals and soils which are likely to be encountered in the metalworking and finishing fields.

Covering the typical problems involved in soak cleaning, steam gun cleaning, spray washing machine clean-

ing, and electrocleaning, the heavy-stock, six-page folder, Bulletin M240, has been designed for easy filing as a readily available source of complete cleaning information.

OBITUARY

ALEXANDER BRAUN

Alexander (Al) N. Braun, president of Braun Organic Finishes, died of a heart attack on May 2nd.

Mr. Braun was president of the Metal Finishing Suppliers' Association in 1953 and had been active in the lacquer industry for many years.

BUSINESS ITEMS

Frederick Gumm Chemical Co. Appoints Distributor

Frederick Gumm Chem. Co. has announced the appointment of *Allied Plating Supplies* as distributor of their products in the State of Florida. Allied maintains a complete stock of Clepo metal cleaning, aluminum processing, burnishing, deburring, and specialty compounds for the metal finishing industry in their warehouse at 5000 E. 10th St., Hialeah, Fla., available for immediate shipment. The sale of these compounds will be directed by *Frank X. Marinello*, president of Allied, in conjunction with *Abe Schorr*, distribution manager, and *Earl Kennedy*, sales manager.

Florida Chemists & Engineers Moves

The consulting firm of *Florida Chemists and Engineers, Inc.*, Orlando, Fla., have acquired a building which they are remodeling and equipping for increased and enlarged chemical facilities. The building is located at 645 Rugby Ave., in the College Park section of Orlando, two doors east of the College Park Post Office. New offices and expanded laboratories are being put to use.

The firm carries out metallurgical investigations and has provided clients with information on industrial waste disposal. The director of the firm is *Robert A. Nanz*, and attached to the staff is a chemical engineer, *Robert M. Adams*, registered in the state of Florida.

Binks Makes New Appointments

Several new branch sales appointments were recently announced by *Binks Mfg. Co.*, Chicago, Ill.

William Krusen is now a sales representative for the Kansas City territory. *Thomas Frederick* and *Harry Boult* have joined the Dallas branch and, in the east, *Henry Glass* has been appointed sales representative for the Philadelphia branch. The New Jersey area will be covered by *Robert Muessig*, who will make his base of operations in New York City.

Historical Announcement . . .

McCOY'S NEW 2311 ORGANIC PROCESS*

FOR

LEVELING BRIGHT CYANIDE COPPER PLATING

2311 produces BRILLIANT MIRROR-LIKE DEPOSITS from 0 to 100 ASF.
2311 produces MICRO-LEVELING WITHOUT CURRENT MANIPULATION.
2311 is a SINGLE BRIGHTENER* ADDITION solution — easy to control — economical.
2311 uses our NON-FOAMING WETTING AGENT* — even in air agitated solutions.
2311 may be purified of ORGANIC or METALLIC CONTAMINATION such as chromium, selenium, sulphur or zinc by simply adding SP (special purifier)*
2311 with our EXCLUSIVE ANODE MATERIAL — ELECTROSOLV* — gives "electropolished" anodes and remarkable freedom from roughness.
2311 is a PROVEN PRODUCTION PROCESS with millions of ampere hour plating experience.
2311 contains NO VERSENES or CHELATING MATERIALS which interfere with chromium removal or copper removal in waste water treatment systems.
2311 is sold and serviced by qualified men in your area.

*U.S. and foreign patents applied for.

Write for operating manual and service organization in your area.

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ELECTROCHEMICAL PRODUCTS CO.

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Brookfield, Wisconsin — Sunset 6-7130

economical cleaning . . .
dependable equipment . . .
factory-trained maintenance

SONOGEN®

ultrasonic cleaning equipment offers all these . . . PLUS

Limitless flexibility of units to fit **any** job from the lab to the production line . . . with experienced counsel in planning your installation, skilled help in installation and use, and quick, conscientious service when you need it!

SONOGEN'S range includes ½-gallon laboratory units, roll-around cleaners, modular-cabinet systems with Filter, Rinse, and Dryer, and engineered installations for conveyorized washers and degreasers as well as continuous wire and strip lines.

State your problem, ask for our free 24-page book on Ultrasonic Cleaning principles, equipment and techniques — S-200.

To: **BRANSON ULTRASONIC CORP.**
21 Brown House Rd., Stamford, Conn.
Mail your new 24-page book on Ultrasonic Cleaning to:

*Name*_____
*Dept.*_____ *Title*_____
*Firm*_____
*Address*_____
_____
*I want to clean*_____
Sales Engnr. to call? Yes ☐ No ☐

Schaffner Appoints McCarty

Charles D. McCarty

Schaffner Mfg. Co., Inc., announces that a franchise has been issued to *Charles D. McCarty* for distribution of products in the state of Tennessee. He has been thoroughly trained in the buffing and polishing division of metal finishing, and makes his home at 4105 Central Avenue Pike, Knoxville, Tenn., phone MYrtle 1-9411.

Metal & Thermit Adds to Research Staff

The appointment of *Dr. R. M. Kary* as a member of the research staff has been announced by *Metal & Thermit Corp.* He formerly was employed by American Smelting & Refining Co., South Plainfield, N. J.

A native Austrian, Dr. Kary received his Ph.D. in organic chemistry from the University of Vienna. He is a member of the American Chemical Society, the Metropolitan Microchemical Society, and the Scientific Research Society of America.

Directors of Chempump and Fostoria Approve Merger Plan

Directors of *The Fostoria Pressed Steel Corp.* and of *Chempump Corp.* and *Zenith Engineering Corp.* have approved a proposal to merge the three concerns. The combined company would be known as *Fostoria Corporation* and would continue intact the activities of the present companies.

Fostoria shareholders will be asked to ratify the merger agreement at a special meeting in Fostoria on May 12. Chempump and Zenith shareholders will meet on the same day in Philadelphia.

NRC Opens West Coast Engineering Office

NRC Equip. Corp., one of the country's leading producers of high vacuum equipment, has announced the establishment of a West Coast engineering office at Palo Alto, Calif.

Appointed manager of the office is *Edward G. Ferrari*. Mr. Ferrari, a graduate of Boston College with a degree in physics, is a long time member of the firm's engineering staff. The engineering office will share quarters with West Coast Regional sales office at 499 Hamilton St., Palo Alto, Calif.

Some of the Top Lines

REPRESENTED BY

ARDCO INCORPORATED

5000 W. 73rd ST. CHICAGO 38, ILL.

F. L. & J. C. CODMAN CO.
Ventilated and Conventional Cloth and Sisal Buffs

GENERAL ABRASIVE CO.
Abrasive Grain for Polishing, Sandblasting and Tumbling

R. O. HULL & CO.
Rohco Brighteners for Cadmium and Zinc-Hull Cells

LEA MFG. CO.
Greaseless and Spray Compounds — Gripmaster Cement

ENTHONE INCORPORATED
Special Compounds for Blackening, Stripping and Processing Metal

INCLUDING

Manufacture of **ARDCO** Buffing and Polishing Compounds and manufacture and distributor of **ENTHONE** chemicals for the metal finishing industry.

ELECTROPLATING AND POLISHING EQUIPMENT • SUPPLIES

SALES OFFICES: GRAND RAPIDS • INDIANAPOLIS • MILWAUKEE • ST. LOUIS

New Research Center

The Deering, Milliken Research Corporation was organized to serve a number of different mills, with Milliken as their selling agent. The research corporation recently opened a new $2 million research center in Spartanburg, South Carolina. This will be the world's largest industrial textile research center, and it is here that the research phase of the "*Buff Cloth Program*" will be carried out.

Among the facilities of the new research center are nine chemical laboratories, an electrical laboratory, physical laboratory, library, experimental machine shop, and a pilot plant with facilities for duplicating many of the production operations carried out in a mill.

Dresser Electric Moves to New Plant

Dresser Electric Co., Detroit manufacturer of plating rectifiers, rectifier conversion kits, transformers and D. C. power supplies, has moved to a new and larger plant at 2705 Wight St., Detroit.

The DuBois Co., Inc., Appoints Bintzler

Robert L. Bintzler has been appointed staff engineer by *The DuBois Co. Inc.*, manufacturers and distributors

HARPER OFFERS THIS CHOICE FOR

BUFFING DEBURRING POLISHING

THE HARPER

Finest Automatic
Using buff wheels.

Send Samples for Finishing without Charge to

THE HARPERIZER

New, Patented, Double Action Centrifugal Equipment that cuts and colors without wheels, belts or fixtures.

HARPER BUFFING MACHINE COMPANY

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Chicago 10, Illinois	Fenton, Michigan	Cleveland, Ohio	Portland, Conn.
WHitehall 3-3938	MAin 9-7989	SKyline 2-0915	ANdrew 7-2553

NOW DU-LITE 3-O IN USE ON MISSILES

low-temperature black oxide finish for stainless steels

NOW USED IN MISSILE PROGRAM

Du-Lite 3-0 is being used on parts for the U. S. Armed Forces and in the Missile program.

Unusually Versatile
Du-Lite 3-0 can be used on: Stainless Steels, Cast and Malleable Iron. Nickel Alloys such as: Invars, Monels, Niresist, etc.

Remarkable Low Heat
3-0 blackening bath operates at 240°F or less.

No Dimensional Change
Low-temperature 3-0 provides maximum activation necessary for coloring stainless steels without surface damage, or dimensional change often caused by other processes which require excessive heat. This is particularly advantageous in finishing small parts. Delicate optical parts, for example, have been treated successfully while maintaining dimensional accuracy to four decimals. Costly spoilage of finished parts is eliminated.

Economical—Time-Saving
No special equipment is needed. Only replacement of normal drag-out is required.

Easy—Safe To Use
No carboys, special handling or safety precautions necessary. Cold water used for final rinse.

Guaranteed
Du-Lite 3-0 is guaranteed by Du-Lite . . . metal finishing specialists.

Du-Lite
CHEMICAL CORPORATION
6 River Rd., Middletown, Conn.

Rush data on Du-Lite 3-0 to:

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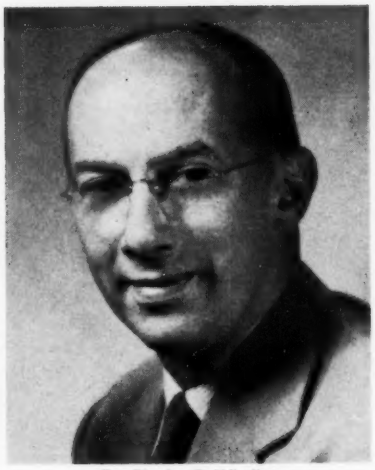
COMPANY .....

STREET .....

CITY ..... STATE .....

Robert L. Bintzler

L. R. Jeffrey, Jr.



Dr. Charles C. Winding

of chemical cleaning compounds. Bintzler, a graduate of University of Cincinnati, is a member of the American Society of Mechanical Engineers. He was formerly associated with the Ransohoff Co., Hamilton, Ohio.

Jeffrey Elected President of National Ultrasonic

The board of directors of *National Ultrasonic Corp.*, Irvington, N. J., has elected *L. R. Jeffrey, Jr.* president and general manager.

Mr. Jeffrey is a graduate of Williams College and Harvard Business School. Before joining National Ultrasonic, he was vice president of Alcar Instruments, Inc.

Also announced, was the appointment of *Gilbert Tint* as vice president and chief engineer. He also will serve as a director of the corporation.

A member of the I.R.E. and the Society for Non-Destructive Testing, he is a graduate of the College of the City of New York and holds a master's degree in electrical engineering from Stevens Institute of Technology. Before joining the firm, Mr. Tint served as chief engineer for Alcar Instruments, Inc. and, prior to that, was project engineer for Fada Radio and Electric Co.

Cowles Elects Dr. Winding

Dr. Charles C. Winding, director of the School of Chemical and Metallurgical Engineering and Professor of Industrial Chemistry at Cornell University, was elected to the board of directors at the annual meeting of stockholders of *Cowles Chem. Co.*, Cleveland, Ohio. All five former directors were re-elected. Dr. Winding became the sixth member of the board.

Divisional Sales Manager Appointed by M&T

The appointment of *Donald R. Meserve* as sales manager of the Organic Coatings Division has been announced by *Metal & Thermit Corp.*

Mr. Meserve has been with the company for seventeen years, during which his responsibilities have included research and development, technical service, production, and sales.

Since 1957, he has served as chairman of the Vinyl Dispersions Division of the Society of the Plastics Industry. He is a member of the National Association of Corrosion Engineers, the National Paint and Varnish Association, and American Management Association.

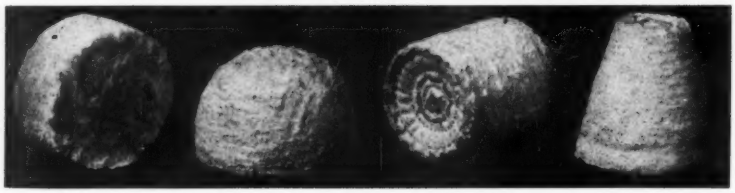
Mr. Meserve is an alumnus of Middlebury College, where he received his degree in Chemical Engineering.

C. S. Mehelich Appointed Abrasive Sales Engineer

The appointment of *Clifford S. Mehelich* as abrasive sales engineer has been announced by the *Pangborn Corp.*, Hagerstown, Md., manufacturers of abrasives, blast cleaning and dust control equipment.

Mr. Mehelich was associated for 9 years as a sales engineer in the industrial and steel trades with Minnesota

BUFFS FOR INSIDE POLISHING



GOBLET BUFFS, TAPER BUFFS, CYLINDER BUFFS, SMALL POLISHING WHEELS, RAZOR EDGE BUFFS, and many others for deburring, polishing and grinding any internal contour.

Write for additional information or contact your local dealer. These buffs are stocked by many dealers throughout the country.

We manufacture a COMPLETE LINE OF BUFFS including full disc loose and sewed buffs and polishing wheels. Our metal center BIAS TYPE BUFF may help cut your polishing costs.

Your request on your letterhead will bring our complete catalog by return mail.

BARKER BROTHERS INC.

ESTABLISHED 1911

1660 Summerfield Street Brooklyn 27, N. Y.

Canadian Distributor — LEA PRODUCTS COMPANY, Montreal

Clifford S. Mehelich

Robert W. Huffman

A. T. Nielsen

Mining and Mfg. Co. He is a graduate of the University of Minnesota with a degree in Mechanical Engineering.

New Company Formed

A new company, *Fuller-Reynolds Chemicals, Inc.*, has been formed to warehouse and sell industrial chemicals in Central Indiana. Facilities will be established in Tipton, Ind. Officers of the corporation are:

President, *Ira K. Fuller*, Wonder Lake, Ill.; vice president, *Les Reynolds*, formerly with Wm. Lynn Chem. Co. Inc.; and sect'y.-treas., *Robert A. Stewart*.

Mr. Reynolds will also serve as director of sales, and stocks will be available in Indianapolis for local delivery.

Personnel Changes and Sales Appointments at Binks

Several sales appointments covering a major portion of the country have recently been made at the *Binks Mfg. Co.*, Chicago, Ill.

New sales representative in the Cleveland area is *Robert Hamlin*, and in the Columbus, Ohio, region *J. Coughlin*. In the San Francisco branch, *Ed Gogin* is a new field representative, and in the Virginia territory *Robert E. Moser* is a new sales representative.

Dan E. Power, Jr., and *William B. Crawford* will represent the company as direct field representatives in the Atlanta branch. The New England territory will be served by *A. Glines*, and *A. McMillan*.

Huffman New President of Solventol Chemical Products, Inc.

Solventol Chemical Products, Inc., Detroit, has announced the election of *Robert W. Huffman* as president and general manager. He succeeds *Howard Downs* who has resigned to accept a position with Downs & Wiles, Wabash, Ind. Mr. Huffman has been executive vice-president of the company.

Cowles Appoints Nielsen

Appointment of *A. T. Nielsen* as plant manager of *Cowles Chemical Company's* operations at Skaneateles Falls, New York, was announced recently. Mr. Nielsen received both his B.S. ChE. and M.S. ChE. degrees from Lehigh University. After leaving the university he joined Worthington Corp. Shortly after World War II he became plant manager of the Citro Chem. Co. in Maywood, N. J. When Citro was purchased by Chas. Pfizer & Co. in 1948, Nielsen was transferred to Pfizer's plant at Groton, Conn., where he became manager in charge of the production of chemicals and vitamins.

Mr. Nielsen is a member of the American Chemical Society and is a licensed professional engineer in New Jersey.

International Rectifier Corp. Appoints Staluppi

The appointment of *John A. Staluppi* as manager of *International Rectifier Corp.'s* New York City branch office, and district sales manager for the New York metropolitan area, was announced recently.

Staluppi is a well-known figure to the New York electrical-electronics indus-

DEPENDABLE PPI PRODUCTS

PLATING RACKS
RUBBER DRUM LINERS
ACID CONTAINERS
ANODE HOOKS
FIBERGLAS TANKS
DUCTS & HOODS
PLASTIC COATED DIPPERS & PAILS
STEEL & STAINLESS STEEL TANKS
LEAD & PLASTIC LINED TANKS
POLYETHYLENE PAILS & CONTAINERS
FUME SEPARATORS
PLATE COILS
LEAD ANODES
DEGREASING SOLVENTS
SILVER BRIGHTENER

NEW • DURABLE • LIFETIME

PPI TITANIUM ANODE HOOKS

This New Titanium Anode Hook Is Almost Indestructible When Used With — Nickel, Chrome, or Acid Copper Plating Solutions

Advantages that will save you money . . .

- No chemical or electrochemical attack on titanium hooks by plating solution
- No foreign metal to contaminate solution from the titanium hooks
- Titanium hooks can be placed completely under plating solution level . . . thus, minimizing scrap loss
- Hook threads will not decompose in plating solution
- No electrolysis on the surface of titanium that is exposed to the solution; therefore, hooks will not generate gas or decompose brighteners

NOTE: Titanium metal can't be used in cyanide or fluoborate solutions

Titanium Anode Hooks are made of 3/8" square stock in 3½" thru 8" graduated lengths to fit 1½" dia. anode rod size or less. Special size hooks quoted upon request. PPI makes a complete line of anode hooks . . . Write today for prices and complete details.

PATENT PENDING

A Few PPI Territories Open For Distributors . . . write for details

PLATING PRODUCTS, Inc.

1509 N. WASHINGTON
KOKOMO, INDIANA

John Staluppi

Richard Bennett

Peter Arnold

try. His background includes extensive experience in New York management and engineering circles before joining International, where he served as assistant national sales manager at company headquarters in El Segundo, Calif.

He is graduate of Newark College of Engineering, where he received a Bachelor of Science degree in electrical engineering. He has also taken advanced courses of study at Rutgers University.

Torit Names New Regional Sales Manager

Richard Bennett has been made regional sales manager for the Chicago area for *Torit Mfg. Co.* He will supervise sales activities in Chicago and its neighboring industrial area. *E. A. Davenport*, 1559 W. 83rd St., Chicago, will continue as manufacturers' representative for the firm.

Bennett comes to the organization from Voss Machinery Co., Pittsburgh, where he was a sales engineer for the past five years. Prior to that he was associated with Induction Heating Corp., Brooklyn, N. Y., and Republic Aviation Corp.

Arnold Promoted at H-VW-M

Hanson-Van Winkle-Munning Co. announces the promotion of *Peter Arnold* to the company's sales engineering staff.

Arnold became associated with the firm as a consulting engineer in 1954. He joined the company's engineering department in January, the following year, specializing in automation and material handling.

Mr. Arnold is a graduate of Rutgers University. He holds a B.S. in Aeronautical Engineering. Before joining H-VW-M, he was associated with Eastern Aircraft Corp., a division of General Motors Corp., and the Stratford Pen Corp., where he was in charge of research and development.

Arnold is a member of the American Chemical Society, the American Society of Tool Engineers, the American Ordnance Association, and the American Electroplaters' Society.

Atlas Mineral Products Co. Appoints Distributor

Atlas Mineral Products Co. of Mertztown, Penna., has announced the appointment of *Dygert Co.*, 520 W. 56th St., Minneapolis 24, Minn., to represent their complete line of corrosion-proof construction materials in the Minneapolis territory.

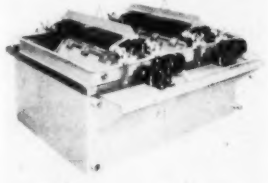
Earle R. Loomer Appointed by Deering, Milliken & Co.

Deering, Milliken & Co., Inc., New York, selling agents, announce the appointment of Earle R. Loomer, Jr. as merchandise manager for the Gainesville (Georgia) Mill. Mr. Loomer's entire business career has been in the textile field. One of the current major projects under Mr. Loomer's guidance is

CuCN

CHEM-SALTS, INC.
P.O. BOX 2803, STATION D
ATLANTA 18, GEORGIA
and
P.O. BOX 790
WATERBURY 20, CONN.

LAZO — The Pioneer for Better Metal Finishing



LAZO Model 2-SHSD . . .
2 Barrel Production Unit . . .
Motorized

Size: 14"x30" inside cylinder dimen.
Size: Overall: 72"x57"x39" high
⅛" Standard Perforations
Any Type Parts up to 4" dia.
All Plating Solutions
Holds up to 150 lbs. per barrel

Equipped with 2 side-drive Lucite Barrels. Each barrel driven by its own heavy duty, gearhead motor, mounted on side of tank. Necessary anode and cathode bus bar connections. Copper-brazed blocks mounted outside tank.

Originators of Ribless Plating Barrels

HARDWOOD LINE MFG. CO.
2022 N. California Ave., Chicago 47, Ill.

Earle R. Loomer, Jr.

Stanley E. Beauregard

Eugene O. Eagle

the Buff Cloth Program, inaugurated in 1958. The purpose of this program is to acquaint the many users of polishing and buffing wheels with the qualities of the Milliken buff cloths or fabrics.

Adoph Plating in New Quarters

An open house, marking completed installation of new equipment at its $1-million plant, was held April 18 by *Adolph Plating, Inc.*, 832 S. Central Ave., Chicago, Ill. Founded only 12 years ago with $15,000 capital, the firm reached the $1-million a year sales level by 1953.

One of the features of the open house was inauguration of a two-way radio system for communication between the plant and its fleet of nine trucks and five sales and service cars, which will enable the company to maintain constant contact with its vehicles within a 30 to 50-mile radius of the plant.

Other highlights of the open house included a guided tour of the new equipment in the 47,000 square foot building and its 14,000 square foot, covered shipping and receiving area.

Robert L. Giesel, president, is also a 2nd vice president and director of the National Association of Metal Finishers. Other officers of the firm are: *Richard D. Giesel*, executive vice president; *Raymond E. Giesel*, vice president and secretary; *Thomas A. Delihant*, vice president, and *Adoph Giesel*, treasurer.

Beauregard Joins R. O. Hull & Co.

Stanley E. Beauregard has joined the sales staff of *R. O. Hull & Co., Inc.* He brings with him 15 years experience in all phases of metal finishing, the past 5 years having been served as sales engineer in the present locality.

Mr. Beauregard will operate from the Detroit office and serve eastern Michigan industries with a complete line of well-known metal finishing supplies and equipment in addition to Rohco products.

Schaffner Mfg. Co. Appoints Distributor

Schaffner Mfg. Co., Inc., announces that a franchise has been issued to *Eugene O. Eagle* for the distribution of their products in the states of Virginia, North Carolina, and South Carolina.

Mr. Eagle has been in the metal finishing field for many years. His experiences have been in buffing, polishing and the cleaning of metals, and he makes his home at 302 S. Tremont Drive, Greensboro, N. C., Phone BRoadway 3-7569.

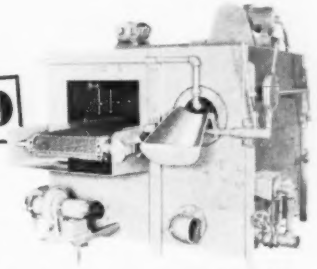
New Advertising Representative for Metals & Plastics Publications

We are pleased to announce the appointment to our staff of *David B. Kingwill* as an advertising sales representative in Wisconsin, Minnesota, Iowa, Missouri and Kentucky.

Mr. Kingwill graduated from Coe College and served as a first lieutenant in the Air Force, working in Korea

A-F "Siamese Twin"
Cleaning and Finishing Machine

JOB ENGINEERED by A-F To Save Floor Space!



- A saving, also, in equipment cost, compared with cost of 2 separate units.
- A saving in handling, because of proximity of two units.
- Both units can be operated simultaneously or independently.
- Cleaning time in both units may be synchronized for smooth production.

Small metal parts are conveyed to *this* A-F "Siamese" Twin Machine in metal boxes covered with cutting oil. The small parts are cleaned in the rotary drum side and the metal boxes in the wire mesh conveyor side. Another example of A-F engineering to solve metal cleaning and finishing problems.

Do you have a metal cleaning problem? Write us today!

A-F

A-F *ENGINEERED* Cleaning and Finishing Machines
Engineered Conveyors and Conveying Systems
THE ALVEY-FERGUSON CO., 502 Disney Street, CINCINNATI 9, OHIO

David B. Kingwill

John A. Faler

as a radar officer. He has been in advertising sales for the past four years and will work out of our Chicago office, 35 East Wacker Drive.

Kolene Corp. Elects Faler

Kolene Corp.'s board of directors has elected *John A. Faler* to the office of vice president in charge of engineering. He has served as chief engineer for the corporation since 1950.

Faler graduated from the University of Detroit in Mechanical Engineering. He is a member of the Engineering Society of Detroit, The American Society of Mechanical Engineers, and the National Society of Professional Engineers.

Canadian Service for Kocour

Kocour Co. of Chicago, Ill., has appointed the *Canadian Research Institute*, 46 St. George St., Toronto, Canada, as an authorized service agency for their electronic thickness tester.

This important move will make available a convenient source of repair to Canadian customers. The extra expense of going through customs, special handling fees, and freight are eliminated.

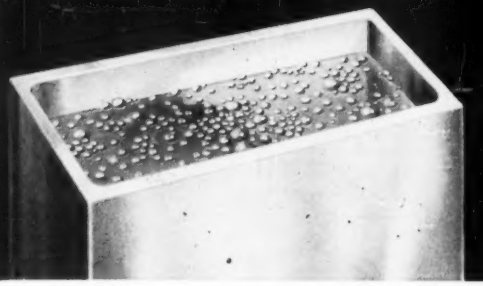
This new service is available direct or through Canadian distributors.

Wyandotte Chemicals Corp. Announces Mexican Subsidiary

Wyandotte Chemicals Corp. has announced the formation of Productos y Especialidades Quimicas, S.A. de C.V., a new Mexican subsidiary company. It is jointly owned by Wyandotte and Mexican businessmen who are interested in, and acquainted with, the manufacture and sale of cleaning products for business and industry.

The new company will have plant and office headquarters at Puebla where the general line of J. B. Ford Division products will be manufactured.

ONLY ACOUSTICA ULTRASONIC CLEANERS HAVE MULTIPOWER!



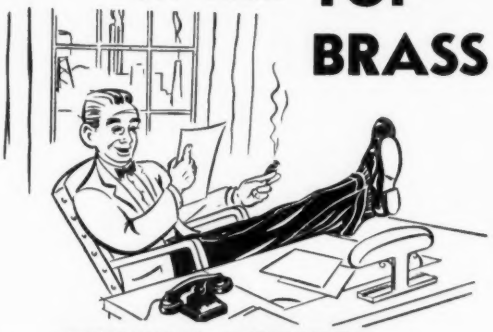
The Multipower transducer multiplies the power and efficiency of ultrasonic action. Cleaning is faster, labor costs are lower. Acoustica ultrasonic cleaners are unequaled in quality and value. Off-the-shelf in capacities from 1 to 75 gal. or custom built to 5000 gal. Expert engineers can help you with your cleaning problems.

Send for further information
Acoustica Associates, Inc., Dept.
Fairchild Court, Plainview, N. Y.

NEW YORK
LOS ANGELES

acoustica
LEADER IN ULTRASONIC RESEARCH

TAKE THE LOAD OFF YOUR TOP BRASS



USE TRUE BRITE BRASS SOLUTIONS

Trouble Free — Low Cost
Little Supervision Needed
Ready To Use — Just Add Water
Uniform Color — Can Match Colors

Write For Bulletin on Brass Plating

TRUE BRITE CHEMICAL PRODUCTS CO.
BOX 31, OAKVILLE, CONN.

New Manager Appointed by Metal & Thermit

The appointment of *F. L. Scott* as technical manager of the Organic Coatings Division, has been announced by *Metal & Thermit Corp.* He has been associated with the company's research operation since 1942.

Mr. Scott is an active member of the American Chemical Society, National Association of Corrosion Engineers, the Society of the Plastics Industry, the American Society of Testing Materials, and the American Electroplaters' Society.

He is a graduate of Boston College, where he received his B.S. and M.S. degrees in Chemical Engineering.

Joseph E. Rhoads

A. Robert Tefft

Promotions at Enthone

Joseph E. Rhoads has been appointed assistant to the general manager of *Enthone, Inc.* of New Haven, Conn. He will assist with the many administrative duties connected with the firm's operations in this country and abroad.

Mr. Rhoads joined the company in 1935 as resident engineer for Ohio, Western Pennsylvania, Western New York and West Virginia and worked closely with the exclusive distributor in that area, R. O. Hull and Co. of Cleveland, Ohio. Previously, he was assistant to the executive vice-president of the Cleveland Chain and Mfg. Co. He is a graduate of Case Institute of Technology with a degree of B.S. in metallurgical engineering.

A. Robert Tefft has been promoted to resident engineer in Cleveland, succeeding Mr. Rhoads. He will be available to give technical assistance to customers in the area in the solution of metal finishing problems.

Mr. Tefft has had extensive experience in the metal finishing field. After attending the University of Rhode Island, he became electrochemist for Blacher Bros., Providence, Rhode Island. He joined Enthone in 1956 as a

BONDING CEMENT FOR ABRASIVE WHEELS AND BELTS

GRIPMASTER® Bonding Cement requires no special sizing thereby cutting heading up time to a minimum. Actually one step in the heading up process can be eliminated. GRIPMASTER also insures a superior bond and greater wheel flexibility. This is what people have been looking for in a bonding cement. Send today for a free test sample of GRIPMASTER and how-to-use literature.

(A member of the well-known Lea Group of Finishing Specialists)

LEA-MICHIGAN, INC.
14459 Wildemere, Detroit 38, Michigan

AGATEEN

Over 50% of watch dial manufacturers in the U. S. A. use AGATEEN #27

Crystal-clear air dry lacquer.

AGATE LACQUER MANUFACTURING CO., INC.
SERVING INDUSTRY SINCE 1927
11-13 43rd Road
Long Island City, N. Y.
Stilwell 4-0660 - 1

AGATEEN
THE LAST WORD IN QUALITY

chemist in the technical service laboratory where he worked on a wide variety of customers' problems. For the past two years he has been resident engineer in Chicago assisting *R. B. Goodsell*, senior resident engineer in that area.

Esbec Barrel Finishing Corp. Expands

On April 24th, 1959 all *Esbec Barrel Finishing Corp.* offices and manufacturing operations were moved to new and greatly expanded quarters at Old Colony Industrial Park, Bldg. 16, 190 Henry St., Stamford, Conn.

All mail should be addressed to P.O. Box 929, Stamford, Connecticut.

The finishing division and laboratory facilities will remain at 26 Charles St., Meriden, Conn.

Bagwell Elected to Hanson-Van Winkle-Munning Board

Hanson-Van Winkle-Munning Co. has announced the election of *Charles E. Bagwell* to its board of directors. Mr. Bagwell joined the company in 1956 as chief engineer. In this capacity he was in charge of all equipment design and engineering for the company's extensive line of automatic metalfinishing machinery and processes. In 1958, he was appointed vice president in charge of engineering. The following year he was selected vice president, Equipment Division, responsible for equipment engineering, manufacturing, and sales for the company.

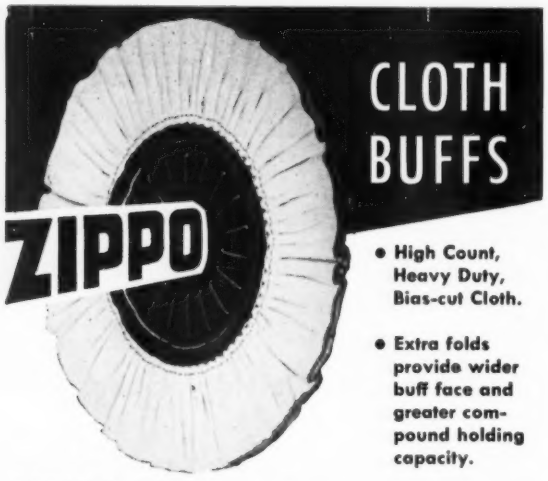
Charles E. Bagwell

Prior to joining H-VW-M, Bagwell was associated with Westinghouse Electric Corp. for eight years. From 1954 to 1956 he was vice president in charge of engineering for the consulting firm Tammen and Denison, Inc.

He is a graduate of the U. S. Naval Academy and served in the European and Pacific theaters. Graduate engineering courses were taken at the University of Pittsburgh where he specialized in servomechanism theory, physics and the study of the electronic controls.

New Agents Appointed by Techline

Four new agents have been appointed by the Techline Division, *Wheelabrator Corp.*, Vicksburg, Mich. *Lester R. Albert, Jr.*, owner of Carol Machine Tool Co., of Ramsey, N. J., will represent the firm in the metropolitan New York area and in northern New Jersey. The New Jersey firm represents several suppliers to the precision finishing industry. *The Bauer Co.* of Fort Worth, Tex., has been appointed agent for the entire state of Texas. This firm employs four traveling representatives throughout the state and maintains its central office in Fort Worth.



- High Count, Heavy Duty, Bias-cut Cloth.
- Extra folds provide wider buff face and greater compound holding capacity.
- Ventilated Steel Centers.
- Perfectly balanced sections require no raking.

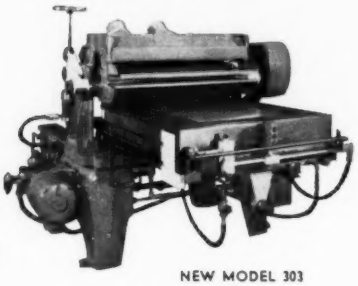
FORMAX BUFFS—These famous fast cutting and long wearing buffs continue to set the standard of performance for bias-type cloth buffs. You can depend on uniform quality from shipment to shipment.

Write for Descriptive Literature

FORMAX MFG. CORP.
DETROIT 7, MICHIGAN
"THE FOUR McALEERS"

THE NEW 303 IS
Versatile

Available in four sizes -- with many optional features. Work held either mechanically or by vacuum.



NEW MODEL 303

✓METALS
✓PLASTICS
✓WOODS

New single roll table type in four sizes. Hydraulic travel: in, out and sidewise. Delicate automatic counterbalancing assures sensitive floating action for flat or contoured surfaces. Quick-Change spindle. Max. floor space: 6' - 10" wide x 10' - 7" deep. Wt. approx. 6,000 lbs. Model 303 can be shipped assembled. Let us know YOUR requirements.

CLAIR
MANUFACTURING CO., Inc., OLEAN, N.Y.
Offering the Most VERSATILE Line of Surface Finishing Machines

Gene A. Castle will handle the northern Indiana and northwest Ohio area. Mr. Castle has had extensive training in barrel finishing processing techniques as well as the sales and servicing of precision finishing equipment and supplies. *Robert H. Tiers*, president of Torrington Chem. & Supply Co., Torrington, Conn., has been appointed in the states of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island.

Metal & Thermit Elects New Vice President

The election of *Herbert E. Hirschland* as vice president in charge of commercial development, has been announced by *Metal & Thermit Corp.* The Commercial Development Division headed by Mr. Hirschland includes the functions of product development, market development, and market research.

Mr. Hirschland started with the firm in 1941 as a process engineer in the then-newly-centralized Research Department. He has been involved in research, production, and sales assignments since that time.

Herbert E. Hirschland

A native of New York City, Mr. Hirschland graduated from Dartmouth, class of 1939, with a Bachelor's degree in chemistry. He received the M.S. degree in Chemical Engineering in 1941 from M.I.T. He is a member of the American Institute of Chemical Engineers, the American Chemical Society, Chemists Club, and Dartmouth Club.

Esbec Moves to New Plant

Esbec Barrel Finishing Corp., manufacturer of barrel finishing equipment, media and compounds, recently moved to a new plant in Stamford, Conn. The new address is 190 Henry St., Bldg. 16, Stamford, Conn.

All administrative, engineering, production, and testing operations, previously divided between Meriden and Byram, Conn., are now consolidated under one roof.

The Esbec Finishing Division, providing custom barrel finishing service to industry, will continue to operate at Meriden, Conn.

Five Senior Salesmen Honored by Maas & Waldstein

Five senior technical representatives, with service totaling more than 133 years, were honored by their company at a special sales meeting in the Essex House, in Newark, N. J. Each received a special gift of silver, "winged-victory" bookends, from *Dr. Gustav Klinkenstein*, president of *Maas & Waldstein Co.*, long-established Newark paint and varnish firm.

Those honored are: *Tom B. Had-*

THIRTY-SEVEN YEARS OF QUALITY

4A

BUFFING & POLISHING COMPOUNDS

for all types of metals

CUT, CUT and COLOR, and MIRROR-FINISHING COMPOUNDS

EASY WASH

MACHINE and HAND CAKES — SPRAY and DIP LIQUIDS

QUALITY — PRICE — SERVICE

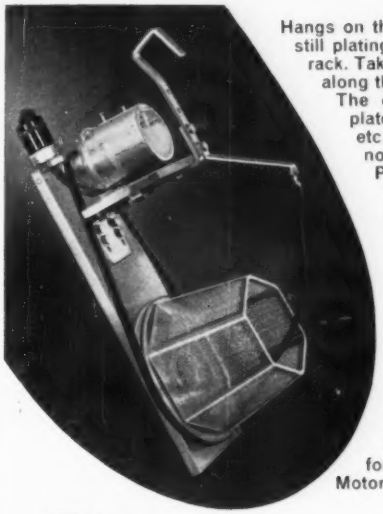
HARRISON & COMPANY, INC.

P. O. Box 457

HAVERHILL, MASSACHUSETTS

Rack-Mounted Barrel Plater

for small lots



Hangs on the cathode rod in a still plating tank like a plating rack. Takes only 6 to 7" space along the cathode rod.

The quick easy way to plate small lots, samples, etc. with no delay; and no production tie-up. Plates any quantity from a spoonful to a pint in practically any plating solution.

Just lift out of the tank and pour the work out; reload and hang on the cathode rod.

Cylinder inside dimensions: 4⅛" deep, 4⅛" at small end, 5¾" at large end. Standard perforations, 1/32". Motor, 115V, 60C, 1 phase.

Roller MANUFACTURING COMPANY

947 N. Cicero Ave., Chicago 51, Ill.

EVERYTHING FOR PLATING PLANTS

(Left to right) Alexander W. Keller, Tom B. Haddow, Don P. Volino, eastern sales manager; Dr. Gustav Klinkenstein, president of the company; E. R. VanDerHoef, William Treadwell and Ben Warren.

dow who, at 81, is still active as a technical representative in the New York metropolitan area and has been with the company for more than 38 years, *E. R. VanDerHoef*, 32 years with the firm, *William Treadwell*, 23 years of service, *Alexander W. Keller*, 20 years of service, and *Ben Warren*, also 20 years of service.

Northwest Chemical Appoints Canadian Licensee

Armalite Co., Ltd., Crystal Arts Square, Toronto, Ontario, has been licensed by *Northwest Chemical Co.* of Detroit to manufacture and sell its products in Canada.

Armalite has organized a new division known as the Alkali Division. This division will be managed by *D. E. Wellman* who has represented Northwest for many years. Mr. Wellman has a rich background of experience in the metal finishing industry. His knowledge of metal finishing problems, coupled with Armalite's ability to produce high quality, uniform products, bring to the Canadian metal finishing industry a new domestic source of technical skills and products.

Northwest products, manufactured by Armalite, will be identical in quality and backed by the same high caliber service as when these products were manufactured in the States. All new products developed by Northwest Chemical will, in turn, be available in Canada.

Vice-Presidents Appointed at Canadian Hanson & Van Winkle Co. Ltd.

Canadian Hanson & Van Winkle Co. Ltd., announces that *V. L. Richards* and *F. E. P. Griggs* were appointed

A UNIVERTICAL A
N High Purity N
O • O
Be Ahead Of The Rest
D GET THE BEST! D
• E
E You Can Be Sure Of S
S QUALITY
SERVICE
and VALUE

UNIVERTICAL
FOUNDRY AND MACHINE COMPANY
14841 Meyers Rd., BRoadway 3-2000, Detroit 27, Mich.

SINCE 1939

VIRGIN METALS
USED EXCLUSIVELY

"pH PAPERS"

Accurate pH Values in a few seconds right at the tank.

Indicator AND control-colors on SAME strip. Control-colors in steps of 0.2 pH and 0.3 pH.

Plating ranges
(200 strips of a range per box)

Acid:	Alkaline:
6.0-7.4 pH	6.6- 8.0 pH
*4.8-5.2 pH	7.3- 8.7 pH
*3.6-5.0 pH	8.6-10.0 pH
*2.4-3.9 pH	10.1-11.3 pH
1.0-2.8 pH	10.5-13.0 pH
0.4-1.4 pH	11.0-13.1 pH

*Electrometric Values in Nickel Solutions.

Each range is boxed separately.

PAUL FRANK
118 East 28th Street NEW YORK 16
Tel. MU 9-5286

V. L. Richards F. E. P. Griggs

vice-presidents at a recent meeting of the board of directors.

Mr. Richards was graduated from Queens University in 1932 with a B.Sc. degree in Mechanical Engineering and from McGill University in 1934 with a M.Eng. degree and has been works manager of the company for many years. He will continue to be responsible for manufacturing and engineering.

Mr. Griggs was graduated from the University of Toronto in 1934 with a B.A.Sc. degree in chemical engineering and has been sales manager of the company for several years. He will continue to have responsibility for the company's sales activities.

Associations and Societies

AMERICAN ELECTROPLATERS' SOCIETY

Lancaster Branch

The regular meeting took place April 10th at the City Line Diner, Harrisburg, Pa., with 30 members and 17 guests present.

During the business meeting the following members were elected to office: *Clester Smith*, president; *I. Paul Sharretts*, vice president; *George Gesey*, sec.-treas.; *Martin Faust*, librarian.

Board of Managers: *Arthur Arsenault, Curwin Miller, Robert Plaisted.*

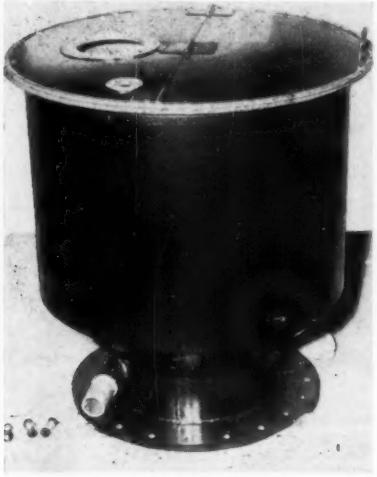
The educational program consisted of a very fine tour through Charles D. Snyder & Son Industrial Electro Platers plant.

I. Paul Sharretts

San Francisco Branch

New officers elected to serve for the 1959-60 fiscal year are:

President, *Trevor Harry;* 1st vice



Protector of Profits

PROTECTION for your equipment against acid corrosion is a capital way to safeguard operating profits. Storts does it for you with lead linings that cover every vulnerable part, linings that are strongly and soundly welded. The Storts lead welding shop is known far and wide as New England's best. Don't try to get along with less when you need lead linings.

STORTS WELDING COMPANY INCORPORATED

38 Stone Street
MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

Electro-polishing

FOR BEAUTY, ECONOMY, SPEED

Fast, low cost finish for aluminum, copper and alloys, steel and stainless steel. Ideal for decorative finishes, burr removal, electroplate adhesion and size control. Standard and custom concentrates nationally available in any quantity.

Electro-Glo

See us in Booth 276A at the 5th Industrial Finishing Exposition, Detroit - June 15-19

Electro-Glo Company, 625 S. Kolmar Ave., Chicago 24, Ill.

president, *Richard T. Coen;* second vice president, *Stanley Bauman;* secretary-treasurer, *Calvin E. Snelgrove;* and Librarian, *Murray Hart.*

Named to the board of managers were *J. R. Pattenger, Harold Smallman, Dominic Maviglia, Fred Huntington,* plus past-president *Jack Hite* as ex-officio member. *Alfred Lee* was appointed sergeant-at-arms.

The branch's first sustaining membership was acquired in April, the firm being Schlage Lock Co. of San Francisco.

Waterbury Branch

The branch was forced to cancel its March meeting because of an unexpected snow fall. The scheduled speaker of the evening agreed to address the branch at the regular April meeting. President *Ed Garland* called this meeting to order at the Roger Smith Hotel on Thursday, April 9. Technical chairman *Al Griffith* introduced the speaker, *Delmar E. Trout,* who spoke on the topic, "Designing with Copper Alloys." He presented interesting information about the composition and physical properties of many widely used copper alloys and described applications in which the various alloys were well suited. It was an excellent presentation of information which frequently is not considered by the plater. Mr. Trout is a research metallurgist for the Scovill Mfg. Co. in Waterbury.

F. A. Schneiders

Newark Branch

The April meeting was held on the 17th with over 100 taking part in the Ladies Night program. After movies by *Howard Cobb* a brief business meeting resulted in the acceptance of one application and the election of two members—*Dr. Dennis Turner* of Bell Labs and *Aubrey Haffalovich* of U. S. Army Signal Corps. *Dave Clarin* of New York Branch was introduced, and it was announced that *George Wagner's* health was improved and he would return to the Garden State within the week.

The program was then turned over to Auntie Cyanide (*John Banta*) who buxomly carried on. First, he introduced a skit presented by Branch members (ladies for the meeting, well developed and suitably attired) *Cy La Manna, Al Korbelak, Bill Du Fosse* and *Robert Duva.* This was followed by colored shots of the Cincinnati Convention by *John Kosmos,* after which John then Mistress of Ceremonied the distribution of prizes.

D. Gardner Foulke,
Secretary

Columbus Branch

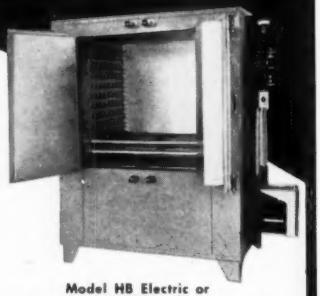
The regular monthly meeting was held at Battelle Memorial Institute on Friday, April 3, at 8:00 P.M. The business meeting was called to order by President *Harry Moore,* and *Donald E. Semones* was duly approved and elected as a member of the branch. *Calvin Smith* was appointed the new junior member of the Tri-State Region.

The nominating committee consisting of *Calvin Smith* and *William Safranek* presented the slate of candidates for branch offices for 1959-60. The results of the election were as follows: President: *Marvin E. Pingel;* 1st Vice President: *Rudolf A. Skriletz;* 2nd Vice President: *Charles B. Murphy;* Board of Managers: *John Beach, Harry Moore, Calvin Smith;* Secretary: *Leslie*

Precise engineering and construction result in

UNIFORM HEAT

throughout the work space



- High velocity recirculating blowers
- Greater heat input
- Adjustable louvres for balanced airflow
- Superior heat seals

All combine to provide *excellent temperature uniformity* in these rugged cabinet ovens.

Model HB Electric or Gas Cabinet Oven

30 Standard Models

- Work space from 4.6 to 72.3 cubic feet
- Temperature ranges from 100 to 1250° F.
- Electronic combustion devices insure safety for gas fired models
- Indicating control instrument
- Factory tested

Other ovens from $110.50 up, including a complete line of laboratory, bench, cabinet, walk-in, and custom-built units.

Write for literature to help you select the right oven for your application

Specialists in Heat Process Equipment

GRIEVE-HENDRY CO.

1421 W. Carroll Ave. Chicago 7, Ill.

MOISTURE-FREE SURFACES in 1/2 THE TIME!

Model 20 New Holland KREIDER Centrifugal Dryer

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McGraw; Treasurer: *Frank Gentile, Jr.;* Librarian: *Hugh Miller.*

Librarian McGraw introduced the speakers of the evening: *Bill Safranek* and *Hugh Miller,* both of Battelle Memorial Institute, whose subject was "The Boy With the Dirty Face." Mr. Safranek and Mr. Miller gave a very interesting talk on improving corrosion resistance of copper-nickel-chromium plated zinc die castings.

Following a question and answer session and a round of applause for the speakers, the meeting was adjourned.

Halvor Christianson

St. Louis Branch

The regular monthly dinner meeting was held April 8th at the York Hotel. There were 34 members and guests for dinner and 50 present when President *William George* called the business meeting to order.

Craig McAlister, chairman of the nominating committee, suggested the following slate which was accepted unanimously: President, *William Piel;* First Vice President, *George Koderhandt;* Second Vice President, *Homer Thomen;* Secretary, *Ward Kelly;* Treasurer, *Louis Berra;* Librarian, *Richard Gotsch;* Board of Managers, *William George, Kenneth Robins; Arthur Wrisberg;* Seargent at Arms, *P. K. Young.*

Librarian *Arthur Wrisberg* introduced *D. J. George,* process development laboratory, Aluminum Co. of America, who talked on Decorative Type Anodic Finishing of Aluminum. Mr. George discussed choice of proper alloys for anodizing, mechanical finishes, bright dipping, color processing and performance of anodic films. A 20 minute sound movie showing some of the latest developments in aluminum was shown.

The good attendance at this meeting indicated the interest. A lengthy question and answer period followed. Mr. George was given a rising vote of thanks and the meeting was adjourned.

Ward Kelly,
Secretary

Chicago Branch

On Saturday evening, April 11, the annual "Ladies-Nite" was held. The place selected was an ideal one, for surroundings and atmosphere. About 150 members brought their wives to the Midwest Country Club in Hinsdale, Ill., for the occasion. The gals were treated to cocktails and a fine buffet dinner including barbecued spareribs and roast beef.

After the excellent dinner, *R. Scott Modjeska* spoke a few words of welcome to the guests. He gave thanks to Librarian *Joseph C. Corre* for the wonderful program of educational sessions during the year. *Paul Glab* discussed financial matters in his inimitable style —seeking more money for the till. *Russ Haar* then introduced the officers for the coming year: *Charles Geldzahler,* president: *Matt Dassinger,* 1st vice-president: *Rudy Hazucha,* 2nd vice-president; *Paul Glab,* secretary-treasurer; *Simon P. Gary,* librarian. The writer then received an award from the branch for his paper on the "Production of Uranium by Electrolysis of Fused Salts." *Mrs. Marion Longfield* was selected to draw the lucky tickets for the door prizes. *Mrs. Eileen Corre* was a winner for the second time.

The program for "Ladies-Nite" was

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a sound and color film of a visit to the island of Sumatra by *Robert Leighton*, renowned world traveler. Everyone enjoyed the amusing comments by Mr. Leighton during the course of the film which was educational and very interesting.

Christopher Marzano

Indianapolis Branch

Thirty members and guests met on April 6 at Fox's Steakhouse for the regular meeting. After the customary introductions, *Bert Hawhee* introduced the speaker for the evening, *John Jumer* of the Alchemize and Electro Glo Corp. of Chicago, who discussed the various baths that are in use for chemical and electropolishing at the present time, with a number of "before" and "after" samples. There was appreciable interest in his talk as evidenced by the questions which were asked by his audience.

John Hood, branch president, then opened the business meeting. The minutes of the last meeting were read and approved, and the treasurer's report was read and accepted. Applications for membership were received from *W. E. Miner*, *Earl Taylor* and *Ronald Pardieck*.

Quentin Shockley reported on the business meeting of the Tri State Region and the proposed revisions to the Tri State Region Constitution and By-Laws. The revisions and amendments will be voted upon at a meeting to be held sometime this fall. *Addison Howard*, branch secretary, read the information and initiative resolution in regards to the proposed amendment to the Society Constitution and By-Laws raising the per capita tax. He then presented his resignation as secretary and delegate, to become effective the 20th of April, as he is leaving the Indianapolis area.

The meeting adjourned at 10:20 P.M.

A. M. Howard
Secretary

British Columbia Branch

There were 30 members and guests at the general meeting held on April 3rd at the White Spot Dining Room. President *Jim Lee* introduced *Jack Hagman* of the Weiser Lock Co. of Canada Ltd., one of the guests for the evening. *Victor Huene* was welcomed as a new member.

Once again there was a discussion on the problem of the night school electroplating course and it was decided that a questionnaire should be mailed to various industries who may be interested in order to ascertain the interest in a night school course which we might expect next fall. A committee was formed to look after the mailing of the questionnaire and *Bill Marquardt* volunteered to act as chairman, with *Antonius Vriends* and *Tom Wallington* offering to assist as committeemen.

After the business session, President Lee introduced the guest and speaker *Dr. R. B. Saltonstall*, technical director of The Udylite Corp. Dr. Saltonstall's topic was "The Role of Agitation in Electroplating." His talk was illustrated by a short movie film showing experimental work which was done involving the study of patterns of air bubble flow in an air agitated solution. When Dr. Saltonstall had finished, he was good enough to take part in an extremely lively question and answer period which lasted for well over an

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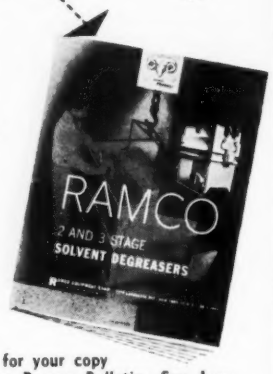

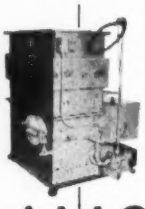

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hour. It was indeed a very interesting and informative evening.

Nelson A. Shepherd
Secretary

Chicago Branch

The branch held its regular meeting at the Western Society of Engineers, 84 East Randolph St., on Friday, March 6. The bad weather did not hold back the attendance as a good number of members were present for the meeting. Five applications for memberships were turned over to the board of managers for approval. "Ladies-Nite" will be held on Saturday, April 11 at the Midwest Country Club, Hinsdale, Ill. The dinner will be $4.00 per person, buffet style, with a choice of three entrées on the menu.

The following members were elected to office: President, *Charles Geldzahler;* 1st Vice-President, *Matt Dassinger;* 2nd Vice-President *Rudy Hazucha;* Sec'y-Treasurer, *Paul Glab;* Librarian, *Simon Gary*. The board of managers consist of *Scott Modjeska, Russ Haar, Ed. Smith, Marian Lonfield* and *Jay Monawek*. The delegates are *Clyde Kelly, Paul Glab* and *Scott Modjeska*. The alternate delegates are *Russ Haar, Charles Gelzahler* and *Larry Hay*.

Librarian *Joseph Corre* introduced the speaker for the evening, *Dr. Abner Brenner*, Chief, Electrodeposition Section, U. S. Bureau of Standards, who spoke on "Recent Researches at the Bureau of Standards."

After the technical session, Dr. Brenner presented colored slides (3-D) of his trip to Moscow, including a commentary of each slide. After the showing of the slides, a question and answer period followed and Dr. Brenner was given a rising vote of thanks for his excellent presentation.

Christopher Marzano
Publicity Chairman

Buffalo Branch

The 5th Annual Empire State Regional Meeting was held Saturday, April 11, at the Hotel Peter Stuyvesant in Buffalo, N. Y. The group is composed of the Rochester, Syracuse, Mohawk Valley, Southern Tier, Capitol District and Buffalo Branches.

Dual educational sessions on plating and organic finishing were held in the afternoon. Introductory remarks were given at the plating session by *Frank Rudolph*, president of the Buffalo Branch and general chairman of the meeting and at the organic finishing session by *John Scholterer*, 1st vice president of the Buffalo Branch.

The plating session was presided over by *Harold Shapiro*, 3rd vice president of the Buffalo Branch. A paper on "The Role of Stress in the Electrodeposition of Metals" was presented by *I. Laird Newall*, president, Henry Souther Eng. Co., Hartford, Conn.

A second paper on "Hard Chromium Plating" was presented by *Manuel Ben*, supervisor, Plating Service Section, General Motors Electrochemistry and Polymers Dept., Detroit, Mich.

The organic finishing session was presided over by *John Donaldson*, librarian of the Buffalo Branch. *Fremont L. Scott*, Manager, Organic Division, Research and Dev. Dept., Metal and Thermit Corp., Rahway, N. J. presented a paper on "Plastisols and Organosols as Protective and Decorative Coatings." *Everett W. Linton*, sales manager, Duralac Chem. Corp., Newark, N. J. presented a paper on "Multicolor Enamels."

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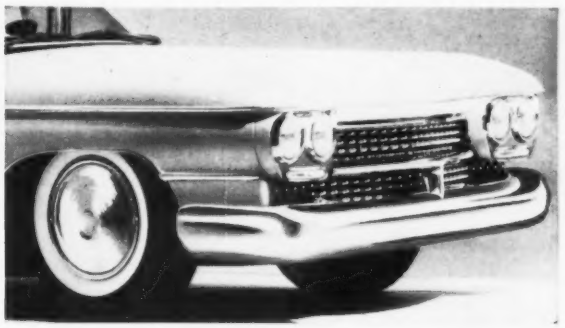

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After the dual sessions, a film "Color and Textures in Aluminum Finishes" produced by the Aluminum Co. of America was shown at a combined session.

The ladies program, with *Mrs. Fred Goeckel* as chairman, was held in the Peter Stuyvesant Room. After the luncheon, an interesting demonstration of floral arrangements was presented by *Clark Kennedy*, well known floral designer for Hodge Florists of Buffalo, N. Y.

The evening's entertainment was highlighted by a banquet in the Starlit room with approximately 225 attending, followed by dancing into the late hours.

Robert E. Lienert,
Secretary

Los Angeles Branch

George J. Hetz, general manager of the C & W Metal Finishing Co., of Los Angeles, was installed as president of Los Angeles Branch at the April 8 meeting in Rodger Young Auditorium.

Earl Coffin, who has served as master of ceremonies at branch installations for more than 15 years, once again performed these duties in his customarily efficient manner in installing Hetz and other branch officers who had been elected at the March 11 meeting. Coffin, a 30 year member, charter member, and past-president of the branch, urged that as one of his first acts as president Hetz instigate a move to have the branch's by-laws revised and brought up-to-date, as they have not been revised since 1953.

Secretary *Don Baudrand* read a letter from Baltimore-Washington branch which solicited Los Angeles Branch's cooperation for an increase in the per-capita tax from $5.70 per member to $10.00, in accordance with discussion held at a recent AES interim meeting in Atlanta, Ga. The branch voted to defer its action on the matter until the May meeting.

Another communication from Baltimore-Washington Branch sought Los Angeles' cooperation toward the election of *Arthur G. Peardon* of Washington, D. C., as a member of the national executive board.

A report on the status of the handbook, which the branch is preparing for issuance in connection with the 1960 convention in Los Angeles, revealed that excellent progress is being made by the handbook committee. Some 40 technical papers, which will appear in the volume, have already been reviewed and edited and membership and sustaining membership rosters are being prepared.

Larry Henderson, general chairman of the Annual Educational Session held on March 21, reported that in excess of 600 persons attended the grand ball and floor show which climaxed the all-day technical and social program. Financially, the non-profit affair could be called a success in that the deficit was so insignificant that one or two more ticket sales could have placed it in the black.

Three new members were initiated at the April 8 meeting: *Lincoln Lowe*, *William Fisch* and *Irving Greenwald*.

The speaker of the evening was *Dr. Richard B. Saltonstall*, technical director of The Udylite Corp., Detroit, Mich. His topic was "The Role of Agitation in Electroplating."

Buffalo Branch

The branch held its last meeting of

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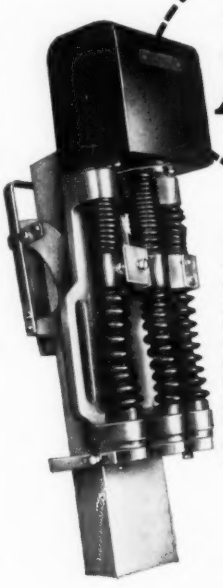

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the 1958-59 season May 1, 1959 at the Niagara Manor, Buffalo, N. Y. Election of officers for 1959-60 was held and results were as follows: President, *Rolland Campbell;* 1st vice president, *Harold Shapiro;* 2nd vice president, *John Donaldson;* 3rd vice president, *John Tiebor;* secretary, *Robert Lienert;* treasurer, *Ernest Jones;* sergeant at arms, *Ray Blechinger;* librarian, *Richard Davis;* and board of managers, *Frank Rudolph, John Scholterer* and *Joe Ruff.*

Eric Simpson, picnic committee chairman, reported on the progress of the committee. It was agreed to hold a basket type picnic similar to last year's in the Jamestown area early in August.

The next business and educational session will be held Friday, September 11, at the regular meeting place.

Robert E. Lienert,
Secretary

Dayton Branch

A regular monthly meeting was held April 15 at the Biltmore Hotel, and *Frank Guerin,* Richmond, Ind., was welcomed as a new member.

Roy Critchfield, technical representative of R. O. Hull & Co., Inc., gave a short explanation of the EDTA method of determining metal content of various plating solutions. He demonstrated the method with zinc, cadmium, copper, and nickel solutions.

C. H. Sample of International Nickel Co., Inc., discussed plating specifications. He reviewed the various exposure tests on nickel plated specimens and pointed out the difference in behavior of bright nickel compared with buffed Watts nickel.

The Annual Spring Party will be held on June 5 at the Moraine Products Gun Club, when the ladies will be treated to a Monte Carlo night.

L. A. Critchfield,
Publicity Chairman

AMERICAN SOCIETY FOR TESTING MATERIALS

The education of the engineer in the materials sciences, the use of isotopes in metals analysis and testing, basic research, and an open forum on standardization of materials for nuclear reactors will be features of the 62nd Annual Meeting of the ASTM at Chalfonte-Haddon Hall, Atlantic City, N. J., June 21-26, 1959.

News from California

By Fred A. Herr

New officers elected to serve San Francisco Branch of the A.E.S. for the 1959-60 fiscal year are:

President, *Trevor Harry;* first vice president, *Richard T. Coen;* second vice president, *Stanley Bauman;* secretary-treasurer, *Calvin E. Snelgrove;* librarian, *Murry Hart.*

Named to the board of managers were *J. R. Pattenger, Harold Smallman, Dominic Maviglia,* and *Fred Huntington,* plus past-president *Jack Hite* as ex-officio member. *Alfred Lee* was appointed sergeant-at-arms.

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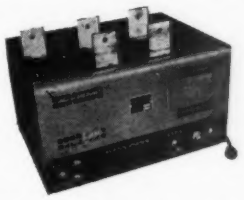
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bership was signed in April, Schlage Lock Co. of San Francisco.

Alert Supply Co., Los Angeles, reports that *Golden Latshaw* has joined the organization as supervisor of services of the tumbling equipment and supply deparment. Latshaw formerly headed his own organization, Golden Latshaw & Associates, consultants on tumbling and deburring methods and compounds. The company has recently been named distributor for Honite products manufactured by Minnesota Mining & Mfg. Co.

Visitors to Los Angeles recently were *C. E. Bagnell* and *D. M. Roney, Jr.*, respectively, vice president and sales manager of *Hanson-Van Winkle-Munning* engineering division in Matawan, N. J. In Southern California on a business trip recently was *Gene Chapdelaine*, vice-president of Conversion Chem. Corp., Rockville, Conn.

A new pickling and annealing facility for production of strip stainless has been installed in the plant of Calstrip Steel Corp., Los Angeles. The new continuous annealing and pickling line is the first for production of stainless strip in the west. Operations are contained in a recently completed 260 foot-long building at 7140 Bandini Blvd. The line includes the latest type annealing furnace, salt bath, and pickling equipment, and special feeding and rewind units. Stainless steel strip will be rolled in widths of 13 inches on a mill which the firm installed several years ago.

A. G. Cafferty, formerly affiliated with the research division of Westinghouse Electric Corp., Chicago, Ill., has become a member of the electrochemical staff of Hughes Aircraft Co. in Culver City, Calif. He will do research on plating problems.

A new plant for production of industrial and general-use computor and data systems, currently under construction in Phoenix, Ariz., for the General Electric Co., will incorporate some installations of particular interest to the metalworking and finishing industries.

The new plant will have one of the most modern tin plating lines in the west. Among the facilities is an automatic tin plate inspection accumulator which supplies a record of quality and quantity of tinplate in the reel as it

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Robert E. Barrett, formerly plant manager for Kwikset Locks Co., Anaheim, Calif., has been named vice president and director of manufacturing for American Hardware Corp.

R. L. Dickensheet completed installation of equipment recently for a new precious metal plating shop, operated under the firm name of Dickensheet Silversmith at 14662 Keswick St., Van Nuys, Calif.

Equipment consists of a 300 gallon silver solution and ten gallon gold and rhodium tanks. Dickensheet plans to specialize in antique restoration for the general public and also to do precious metal plating for industry. He was formerly shop foreman for Fithian, Inc., manufacturers of men's jewelry.

A new terminal and shipping point for trichlorethylene has been established in San Pedro in the Los Angeles Harbor District by the Electrochemicals Department of the DuPont Company. The new facility is expected to expedite shipping to DuPont customers in the Los Angeles and San Francisco areas.

William Fisch, formerly a process engineer with Universal Corp., St. Louis, Mo., recently joined the process engineering staff of Litton Industries, Los Angeles. He has become a member of Los Angeles Branch of the A.E.S.

Paul Franke, who has served in the metal finishing department of Price-Pfister Co.'s Los Angeles plant for 36 years, has announced his retirement from active duty, effective June 21. Paul has been foreman of plating and polishing since 1931. He will not sever his connection with Price-Pfister entirely but, after June 21, will serve as a consultant on plating and polishing problems.

PATENTS

(*Continued from page* 100)

Chromium Plating

U. S. Patent 2,856,334. *Oct.* 14, 1958. *P. J. Topelian, assignor to Tiarco Corp.*

A process of chromium electroplating

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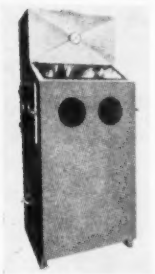

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ELIMINATES COMPOUND WASTE WITH NEW PLASTIC CONTAINER

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an article having a chromium plated surface comprising subjecting said surface to a treatment with a hydrogen halide gas, removing the article from the gaseous medium when the chromium surface assumes a green color, and electroplating chromium on the chromium surface of the article.

Anode Rack for Plating Cylinders

U. S. Patent 2,856,344. *Oct.* 14, 1958. *S. D. Lapham, assignor to Industrial Hard Chrome Plating Corp.*

An electroplating rack comprising: first and second generally coplanar spaced bars arranged in tandem; third and fourth parallel, laterally offset bars straddling the contiguous ends of said first and second bars and defining a rectangular opening therewith, each end of said third and fourth bars being provided with a hole extending therethrough; a machine screw extending through each of said holes and having threaded engagement with one of said first and second bars, the diameter of said hole being substantially greater than the diameter of said machine screw; a first plate overlying the contiguous ends of said first and second bars and inner sides of said third and fourth bars; a sleeve fixed to and extending through said plate at right angles thereto; a second plate circumscribing said sleeve with positive clearance beneath said bars; means for clamping said first and second plates to said bars, said plates being electrically insulated from said bars; and a rigid suspension member secured to and depending from the inner end of each of said first and second bars.

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2. STRESOMETER — Accurate instrument for measuring stress.
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25—Assorted full automatic rotary Buffing, Polishing & Deburring Machines, Divine, Hammond, Packer, Acme, etc. tables from 20" to 72" diameter, with 3, 4, 5 and 6 heads.

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30—Semi-Automatic — single to eight spindle machines, Hammond, Acme, Divine, Automatic, etc.
300—Assorted buffing and polishing machines from 1 HP to 50 HP single and double end spindles, including some variable speed types.
300—Assorted size wood, steel, rubber, plastic, lead lined and stainless tanks up to 30 ft. long.

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100—Sturgis, Roto Finish, Baird, Crown, Belke, Abbott, Henderson and other makes of tumbling, cleaning and burnishing barrels.

1—HVWM 4 Station Plating Unit 36 x 14 Cylinder — for nickel & cyanide.
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10—Semi automatic plating machines, 10 ft. to 35 ft. long for nickel, copper and chrome.
5—Industrial Filters, RDR-2, 36 x 3630, for nickel, complete.
100—Various sizes rectifiers from 25 amp. to 5000 amps. Selenium, Germanium, all complete with controls.
90—Various size Generator sets from 50 to 10,000 amps, Chandeysson, Hanson Van Winkle Munning, Bogue and other standard makes, all complete with panel boards, starters, etc. voltage range 2 volts up to 100 volts, for all purposes.

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3—G. E. 500 amps. 6 volts with control.
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1—Udylite 500 amps. 6 volts with control.

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5—From 12' to 32' long for nickel and cyanide.

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2—Daniels #3.
3—Lasalco steel 36 x 18 Lucite cylinder.
1—Lasalco rubber lined 30 x 15.
1—H-VW-M steel 36 x 18.
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2—Udylite multi-purpose barrel — hard rubber cylinder.

FILTERS
10—Industrial, Alsop, Sethco — all sizes — nickel and cyanide solutions.

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2—Abbott barrels, variable speeds.
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10—Baird barrels 2C tilting type.
8—Henderson barrels 5A tilting type.
4—Globe barrels.

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1—Production Machine #101 — 7½ H.P.
4—#101 Tandum 15 H.P.
2—Production Machine #484-2.
5—Acme A2.
3—Acme B10.
2—Divine Model VM-10 — 10 H.P.
2—L'Hommedieu 5 H.P. variable speed.
15—Holland 5 H.P. — 7½ H.P. — 10 H.P.
1—Acme L-82 — 7½ H.P.
4—Gardener 5 H.P. — 7½ H.P.
6—Divine Idlers.

DRYERS
1—Ronci R100.
2—Barrett centrifugal dryers.
2—Kreider #12 steam explosionproof mtrs.

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Kane gas fired 20 H.P., 7½ H.P.

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1—Detrex alkaline belt washer.
1—Philips electric degreaser.
1—Blakeslee pump type washer.
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1—Blakslee washer.

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1—8000/4000 AMPERE, 6/12 VOLT. **CHANDEYSSON,** Synch.
1—7500/3750 AMPERE 9/18 VOLT. **H-VW-M,** Synch.
1—7500/3750 AMPERE, 6/12 VOLT, 25°C. **CHANDEYSSON,** Synch.
1—6000/3000 AMPERE, 6/12 VOLT. **ELECTRIC PRODUCTS,** Synch.
1—5000/2500 AMPERE, 12/24 VOLT. **CHANDEYSSON,** Synch.
1—5000/2500 AMP., 9/18 V., 25°C., **CHANDEYSSON,** Synch. Exciter-in head.
1—5000/2500 AMPERE, 6/12 VOLT, 25°C. **CHANDEYSSON,** Synch.
1—4000/2000 AMPERE, 6/12 VOLT. **H-VM-M,** Synch., Exc.-in-head.
3—3000/1500 AMPERE, 12/24 VOLT, **CHANDEYSSON,** Exciter-in-head.
1—2000/1000 AMPERE, 6/12 VOLT. **HANSON - VAN WINKLE - MUNNING.**
1—1500/750 AMPERE, 12/24 VOLT. **CHANDEYSSON,** Synchronous.

ANODIZERS
1—1000 AMPERE, 40 VOLT. **CHANDEYSSON,** 25°C.
1—1000 AMPERE, 30 VOLT. **IDEAL,** Exciter-in-head.
1—500 AMPERE, 25 VOLT. **CHANDEYSSON,** Synchronous, Exciter-in-head.
3—400 AMPERE, 40 VOLT. **M.G.C.,** Separately Excited.

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1—**G. E.** 2000/1000 AMP., 6/12 V.
1—**SEL-REX** SELENIUM, 1200 AMPS. 9 V, for 440/3/60.
2—1500/750 AMPERE, 6/12 VOLT, **UDYLITE-MALLORY.**
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SPECIAL
2—**CROWN & H-VW-M** Centrifugal Driers No. 1 and No. 2 with Heat.
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1—**L'HOMMEDIEU** 5 H.P. Variable Speed Buffer, Model 18.
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3—**INDUSTRIAL** RDR-1 Rubber-Lined Filters. Sizes 10x28, 18x28, 14x36.
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1—**HAMMOND** 7 VRO Vari-speed 7½ H.P. Buffing Lathe.
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4—No. 2H **BAIRD** Poliaction Tumblers.
Other outstanding values in stock.
1929-1959 — 30 Years of Service.

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WAREHOUSE CLEARANCE — BUY AS IS IN OPERATING CONDITION OR REBUILT GUARANTEED

AUTOMATIC POLISHING EQUIPMENT

1—Udylite 76' Return Type Extrusion Polisher w/ 7-10 H.P. & 3/5 H.P. Heads.
1—Acme L-8-L with 3 Heads.
1—Packermatic 60" Table 12 Spindles 7 Heads.
1—Packermatic 36" Table 5 Spindles.
1—Acme 10' 8 Spindles.
1—Hammond 30' Reciprocating Table.
1—30' Reciprocating Table.
11—Acme G-3 144" Belt Sanders.
5—Acme G-1 Universal 5-15 H.P.
2—Acme G-1 Special Bumper Heads 15 H.P.
35 Murray Way 55 & 60 Series Heads & Sanders.

SEMI-AUTOMATICS

1—Acme E-10 With or Without A-2 Head.
1—Acme E-10 With 45 degree angle flat polishing attachment.
1—Acme A-2.
1—Automatic Machine Co. 4 Spindle—Like New.
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2—Divine 2 Spindles.
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1—Divine 1 Spindle Oscillating with Right Angle Attachment.
15—Automatic Machine Co. Single Spindle with 6" Oscillation.
All Replacement Parts for all Above Machines in stock.
Large Stock of Chucks & Special Attachments & Work Holders.

RECTIFIERS

1—18 Volts, 5000 Amperes Rapid, New Selenium Stacks, Remote Control.
1—18 Volt, 500 Ampere Plaso Selenium, w/full control.
1—48/24 Volts, 1000/2000 Amperes Rapid, W/Control.
1—12/6 Volts, 1000/2000 Amperes G. E.
1—G. E. Automatic Voltage Controller, 6000 Amperes.
9—12/6 Volts, 750/1500 Amperes Udylite, W/Controls.
New Replacement Stacks for Udylite $285.00.
1—Udylite Control for 6000 Amperes.
1—6 Volts, 1000 Amperes Lewis, W/Control.
1—6 Volts, 1000 Amperes Green, W/Control, 2 or 3 phase.
2—6 Volts, 750 Amperes Rapid, W/Controls.
4—6 Volts, 500 Amperes, Rapid, Green, Lewis, Udylite, W/Controls.
10—6 Volts, 500 Amperes New G. E. Copper Oxide.
Replace your burnt out Copper Oxide Stacks $175.00 for Stack & Kit.
10—New G. E. Controls.
10—G. E. Controls 1-4 Units of 500 Amperes.
5—6 Volts, 500 Amperes Westinghouse New 440 Volts.
12—6 Volts 500 Amperes G.E. W/New Selenium Stacks.
6—6 Volts, 300 Amperes G.E. W/New Selenium Stacks & Control.
2—12 Volt, 250 Amperes G.E. W/Control.
1—48/24 Volts, 150/300 Amperes Green W/Control.
12—28/14 Volts, 100/200 Amperes Ther W/Controls.
2—6 Volts 100 Amperes W/Controls.
2—6 Volts to 15 Volts, 50 Amperes, W/Controls.
2—6 Volts to 10 Volts, 25 Amperes, W/Controls.

MISCELLANEOUS

15 ton York Heating & Cooling unit complete.
2—5 H.P. L'Hommedieu #23 vari-speed Pol. Mach.
4—Jewelers Casting Machines.
1—100 Amp. Periodic Reverser.
Industrial Filter 3'x5' RDR-2 w/slurry tank.
20' semi-automatic rubber lined tank—vari-speed.
Hammond OD-9 w/10 H.P. motor.
2—Production 101 w/10 or 15 H.P. motor.
2—Hammond double 7½ H.P. Pol. Mach. like new, model 7-RROWB.
Automatic Detrex degreaser 18" basket, steam, fully motorized.
Holden tempering furnace, 5 station conveyorized, complete w/controls.
2—3 H.P. Hisey-Wolf vari-speed polishing machs.
Crown 12" steam heated centrifugal dryer.
2—New 6' x 3' Ieylite Hoods for exhaust chrome tank.
Acme Straight Line Buffing Conveyor, oval shaped approx. 30' w/Comming Devices.

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Spindles, Nuts, Washers, Spacers, Wrenches, Spinners in Stock.

Plating, Polishing, Grinding, Spraying, Baking, Drying, Tumbling, Cleaning, Degreasing & Anodizing Equipment. Anodes, Chemicals, Acids, Cyanides, Solvents, Supplies for Wood, Plastic and Metals.

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Better Equipment

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6—12/24 Volt—1,500 Amps.—late model Udylites.

Generator Power Available From 30¢ per Amp. and up

1—8/16 Volt—20,000 Amps.
1— 11 Volt—10,000 Amps.
2— 6 Volt—10,000 Amps.
2— 12 Volt— 7,500 Amps.
1— 9 Volt— 7,500 Amps.
1— 6 Volt— 6,000 Amps.
2— 8 Volt— 3,000 Amps.
1— 6 Volt— 3,000 Amps.
1—6/12 Volt— 1,500 Amps.
1—9/18 Volt— 1,500 Amps.

Filters

6—18x48x40 Type SCW-2—Industrials.
3—36x36x30 Type SCW-2—Industrials
2—36x36x30 Type RDR-2—Industrials.
2—Portable Filters.
1—20 ton refrigeration — Frigidaire.
3—2 ton chillers.

All sizes — rubber and Koroseal lined tanks.
All sizes — steel tanks.
Rheostats — 200 Amp. and up.
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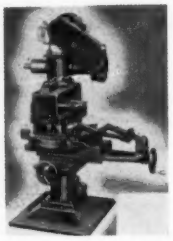
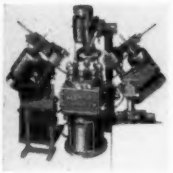


Acme Model E-10

Acme Model B-10

Acme Model A-2



Hammond Model J21 indexing type table rotary polishing machine. 8 spindle — 21" table. 2 - 3 H.P. heads.

2—Acme Skillet Lathe Machines.

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STRAINS PAINTS AND VARNISHES AS YOU SPRAY

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Consult Your Paint Dealer or Order Direct From Factory in Lots of 12

Price $1.50 Ea.

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Used buffs of any description and size. Send samples.

ROYAL INDUSTRIES, INC.
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Small plating shop one or two good men can operate. Want to retire. Sell business—rent premises long lease. Established forty years in New Orleans. Going business.

F. E. ST. PE
Modern Plating & Polishing
New Orleans 17, La.

RECTIFIERS FOR SALE

6—Udylite 1500/750 at 6/12 basic with magnetic starters. Can be inspected under load conditions. Would prefer to sell lot for $2,000.00, but will sell piece-meal.

KRALL PLATING CO.
2105 E. 77th St. Cleveland 3, Ohio
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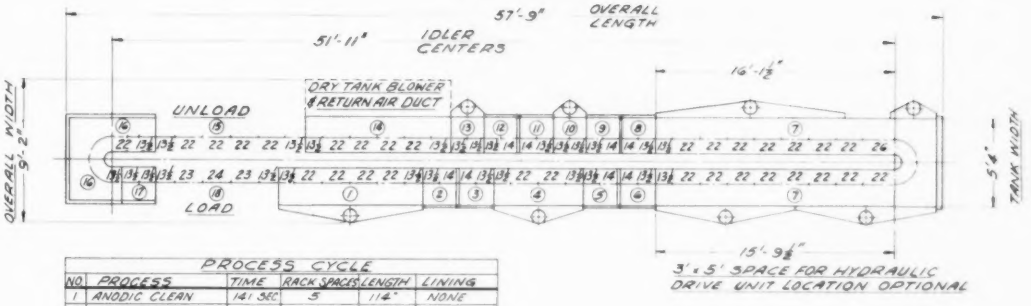

PROCESS CYCLE

NO.	PROCESS	TIME	RACK SPACES	LENGTH	LINING
1	ANODIC CLEAN	141 SEC	5	114"	NONE
2	COLD RINSE	15 "	1	54"	"
3	COLD RINSE & SPRAY	15 "	1	54"	"
4	ACID DIP	57 "	3	70"	KOROSEAL
5	COLD RINSE	15 "	1	54"	"
6	COLD RINSE & SPRAY	15 "	1	54"	"
7	CADMIUM PLATE	729 "	19	438"	NONE
8	COLD RINSE	15 "	1	54"	"
9	COLD RINSE & SPRAY	15 "	1	54"	"
10	BRIGHT DIP	5 "	1	26"	KOROSEAL
11	COLD RINSE	15 "	1	54"	"
12	COLD RINSE & SPRAY	15 "	1	54"	"
13	HOT RINSE	15 "	1	26"	6# LEAD
14	DRY	183 "	5	114"	NONE
15	UNLOAD	168 "	5	114"	"
16	RACK STRIP	100 "	4	104"	KOROSEAL
17	COLD RINSE	15 "	1	26"	"
18	LOAD	100 "	4	96"	NONE

FLOOR SPACE (APPROX) - 57'-9" LG. x 9'-2" WIDE x 11'-8" HIGH
RACK SIZE - 18" x 8" x 36"
ANODE CENTER - 18"
RACK CENTERS IN TRANSFER - 27" & 28"
RACKS PER HOUR - 85
TRANSFER TIME - 27 SECONDS
DWELL TIME - 7 SECONDS
TANK DEPTH - 54"
TANK WIDTH - 26"
MACHINE TO HAVE A DELAYED SET-DOWN AT STATION #10 BRIGHT DIP

LOCATED IN MIDWEST • MACHINE CAN BE OPERATED FOR INSPECTION

WE HAVE THE MOST DESIRABLE AND VARIED STOCK OF EQUIPMENT IN THE COUNTRY.
WE ALSO PURCHASE USED AND SURPLUS EQUIPMENT

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Better Buys

Better Equipment

1—Hanson-Van Winkle-Munning —two lane 64 inch lift. Adapted for copper-nickel and chrome.

1—Hanson-Van Winkle-Munning —Two lane — 36 inch lift. For cadmium or zinc.

1—Hanson-Van Winkle-Munning —Single lane — 36 inch lift. For cadmium or zinc. Can be adapted for nickel and brass.

1—Stevens automatic barrel plater, model C — 31 barrels. Can be redesigned for any cycle.

1—Semi-automatic nickel plater.

2—Semi-automatics — for copper, cadmium or zinc.

1—Udylite return type — fully automatic horizontal zinc or cadmium plating machine — 16-36 cylinders — bright and dichromate. Can be skipped or delayed.

Mercil plating barrels — complete with tanks and gear drives.

Ransohoff spiral dryers — steam or gas fired.

PLATING SERVICE AND EQUIPMENT CORP.
3620 Hart St. Detroit 14, Mich.
Phone: Valley 3-1852

PLATERS AND ANODIZERS

M-G SETS — Motor 3-60-220/440

Amp.	Volt	Make
125	40	Star
200	7½	Chandeysson
200	65	G. E.
300	7½	Hobart
400	60/60	G. E.
400	6	H-V-W
500	60	Westinghouse
698	47.5	Elec. Prod.
750 (Twin)	6	H-V-W
750/375	6/12	Excell-All
845	47.3	Elec. Prod.
940	32	Elec. Prod.
1000/500	6/12	Chandeysson
1500/750	6/12	G. E.
1500	15	Star
1500	30/50	Century
1500	40/65	G. E.
1500	65	Westinghouse
1500	70	Century
2500/1250	6/12	Elec. Prod.
5000/2500	6/12	Columbia
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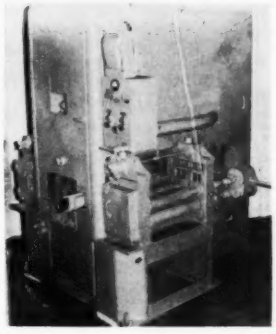

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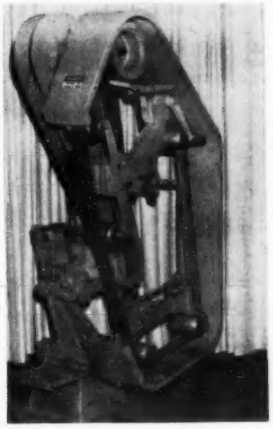

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Kocour Company 50
4802 S. St. Louis Ave., Chicago 32, Ill.

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Rahway, N. J.

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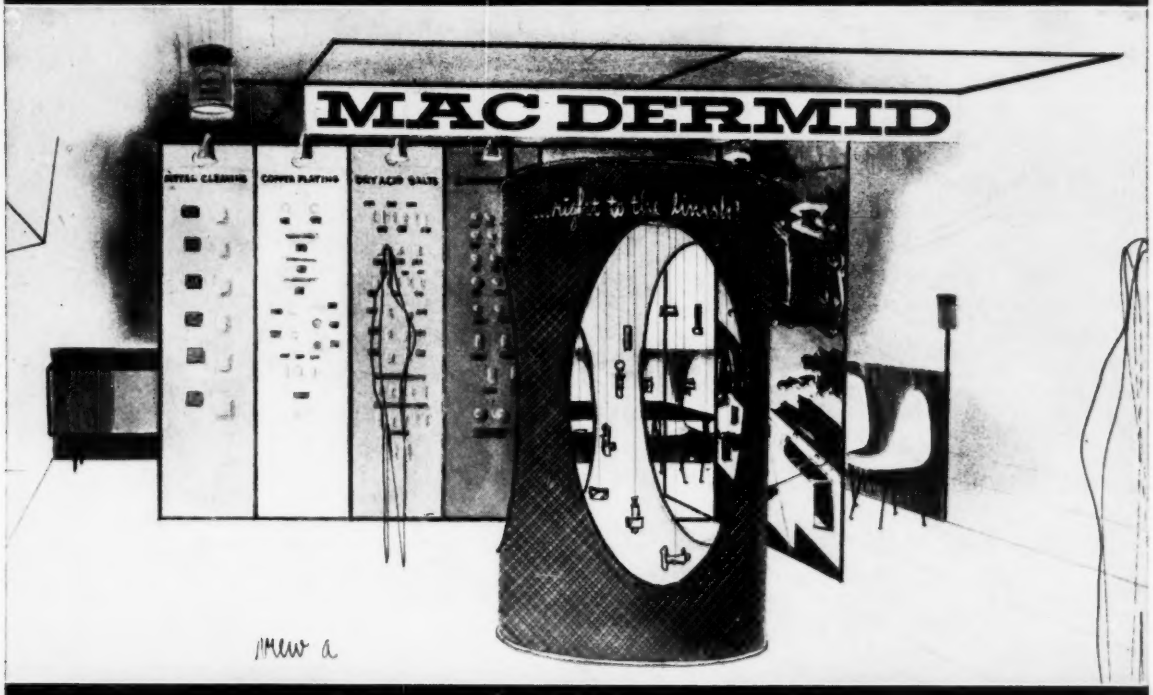

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